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Volume 50, No. 5

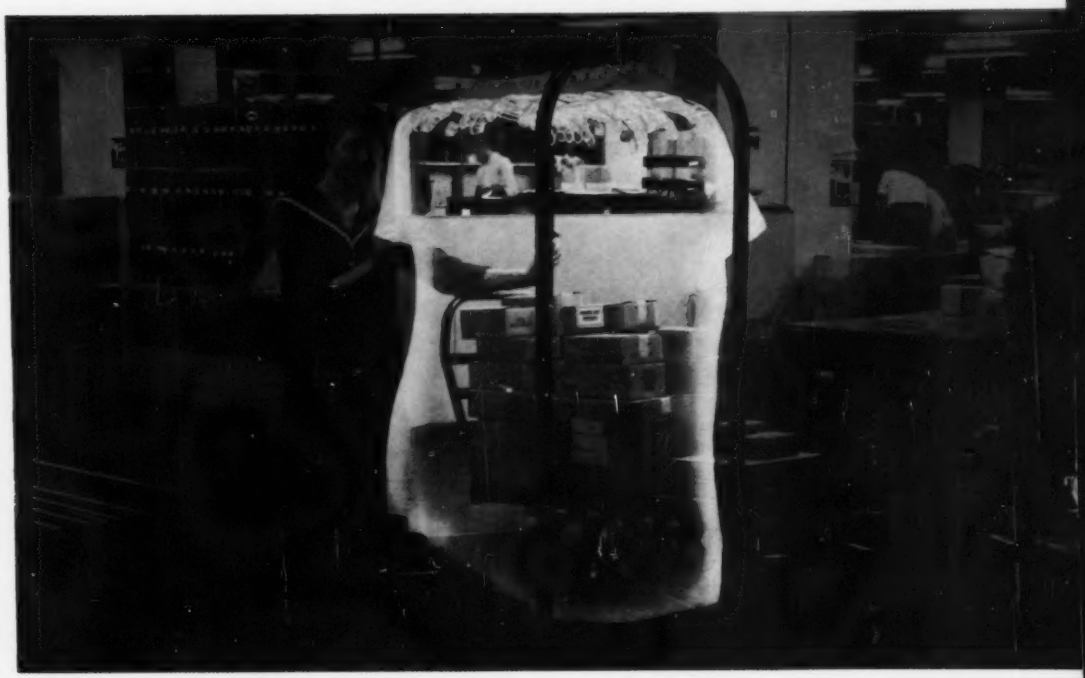
OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

AMERICAN

DYESTUFF REPORTER

TEXTILE WET-PROCESSING

HOWES PUBLICATION



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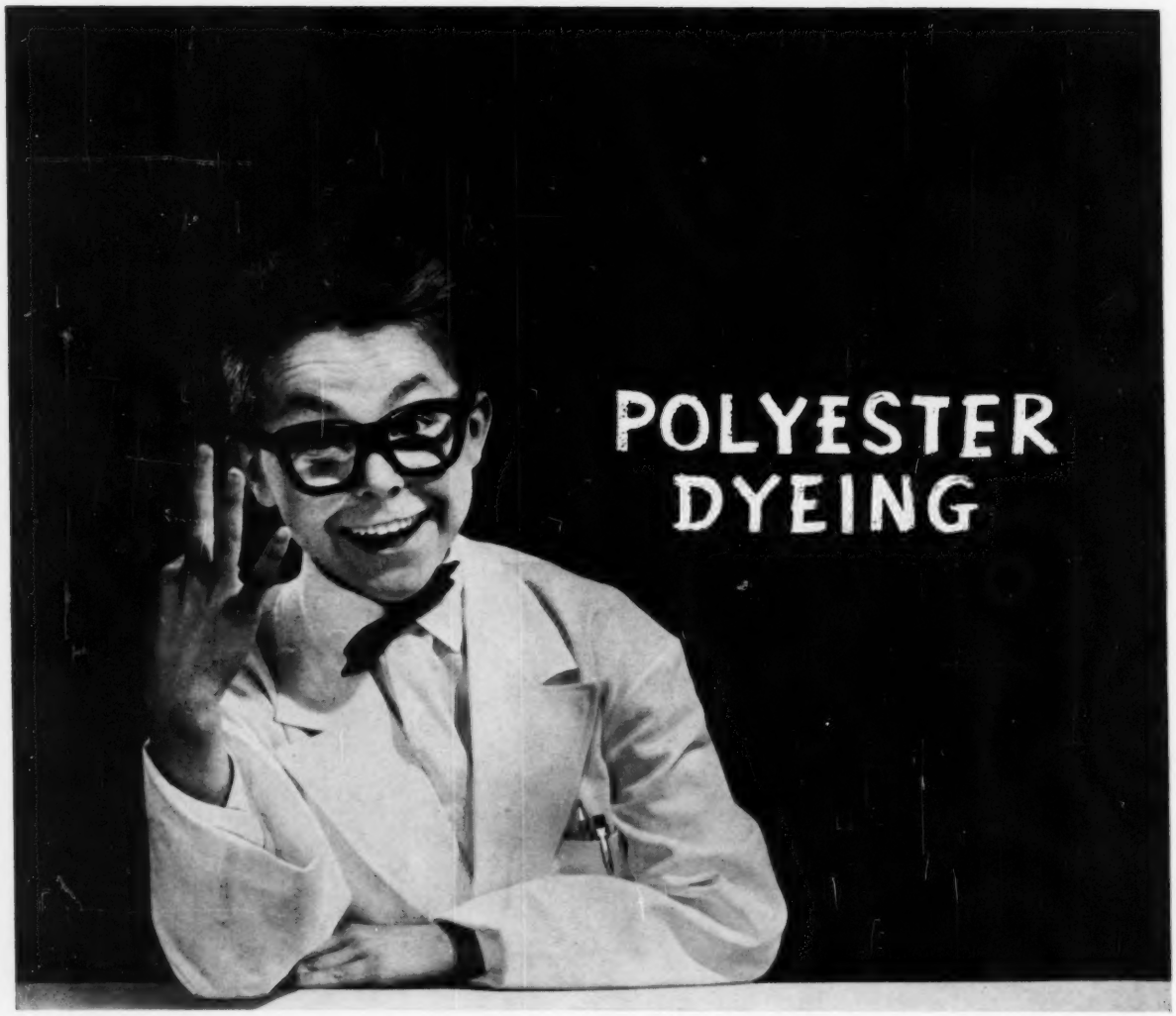

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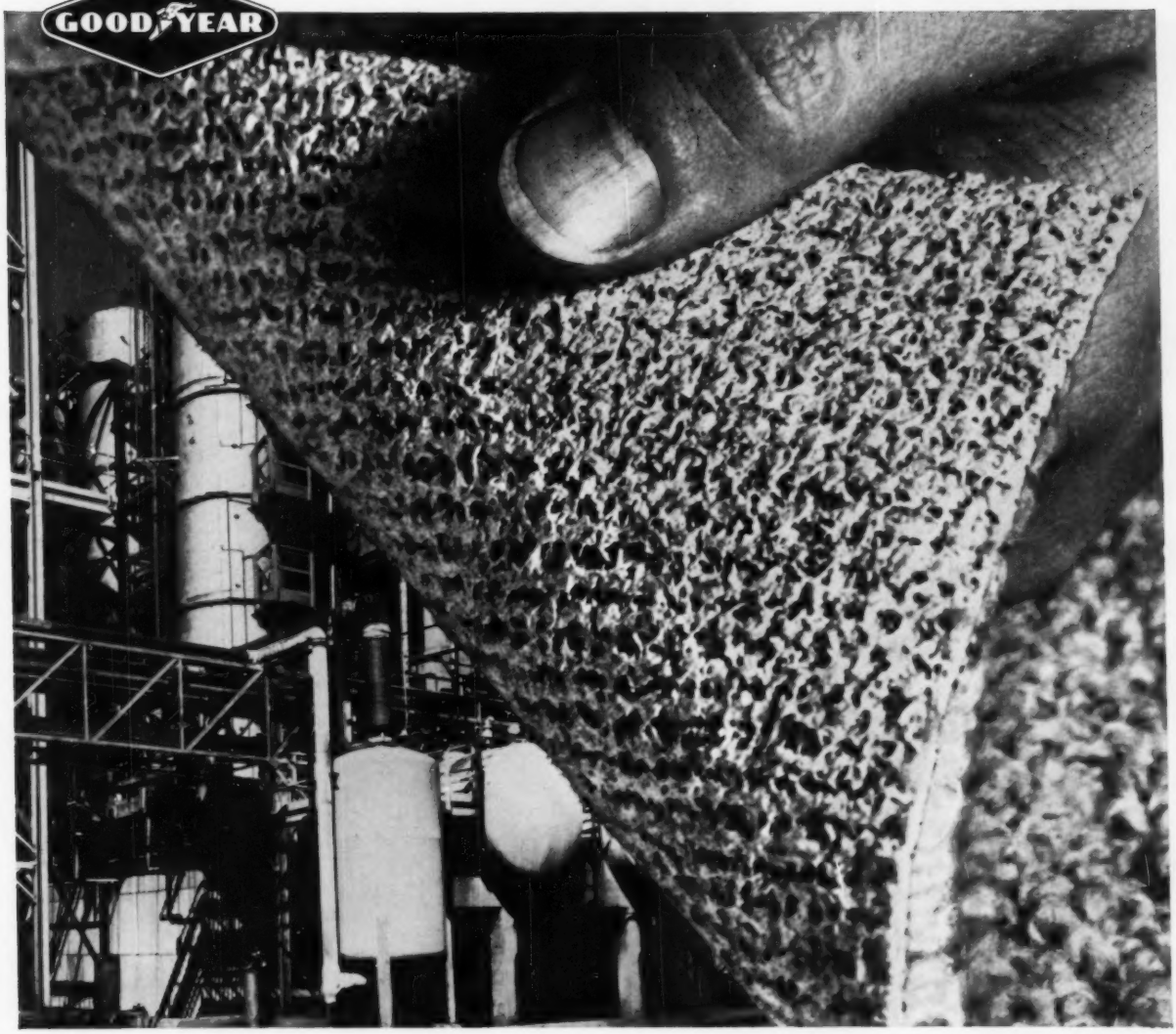

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Another example of "Virginia" nationwide technical service

Tender fabrics were tendered

While calling on an old-established bleachhouse, one of our salesmen learned of a costly problem—unaccountably, some of the more delicate fabrics were tendered after bleaching. He suggested a "Virginia" technical service man be put to work on it and the company thought it a good idea. The trouble, it was disclosed, was caused by sulfuric acid, which remained in the fabric after rinsing. At the dry cans, evaporation of water concentrated the acid, causing serious tendering of the goods. Compounding the error, the operator suspected the cause to be insufficient neutralization and increased the acid strength. The "Virginia" man urged a change to liquid SO_2, for two reasons—it is more economical and is driven off at the dry cans. Any traces of SO_2, he pointed out, would pass off in a faint vapor—and the water in steam. The suggestion was approved. Tendering stopped. If you want the assistance of "Virginia" technical service on any problem, a letter or phone call to us will bring prompt action.

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New High Temperature
Launder-Ometer
for high temperature dyeing
up to 300° F.

L-2587X—
Stainless Steel High Pressure Containers

A high boiling point fluid such as ethylene glycol is employed in the bath. It is rapidly brought up to 300° F. by electric immersion heaters and is quickly cooled to handling temperature by a water cooling coil. The combination Thermometer-Thermostat is supplied calibrated in F° or C°.

The stainless steel bath, or tank, is fabricated with special high temperature soldered joints and extra insulation is installed on all sides of the bath.

20 new high pressure stainless steel containers, 3" x 6" high may be used simultaneously. The containers are provided with fittings which permit injection of additives during test and release of any built up pressure before opening.

Containers are held in place by a new fixture that allows quick removal of one to five containers at one time with a minimum delay.

For standard Launder-Ometer tests up to 212° F. water is employed in the bath with conventional specimen containers.

Model LHD-HT Launder-Ometer with preheating loading table, standard supplies and accessories, but not including metal specimen containers—208 or 230 volts, 60 cycles A.C. Single or Three phase,

Domestic packing F.O.B. our plant, Chicago

$1,195.00

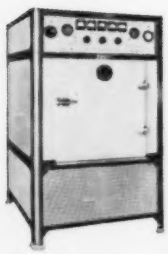
M-2587X Stainless Steel High Pressure Containers for Model LHD-HT Launder-Ometer, 3" dia. x 6" long, with cover and two gaskets.

Each **$11.55**

L-2432X Stainless Steel Containers, capacity one-pint, for temperatures not exceeding 212° F., with cover and two gaskets.

Each **$13.00**

Write for literature giving complete information



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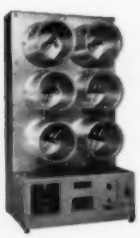

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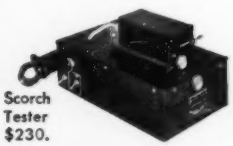

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DETERGENT W-1750 A—Has anionic and non-ionic properties; excellent for scouring nylon and dacron to remove throwster sizings; penetrates and lifts graphite streaks.

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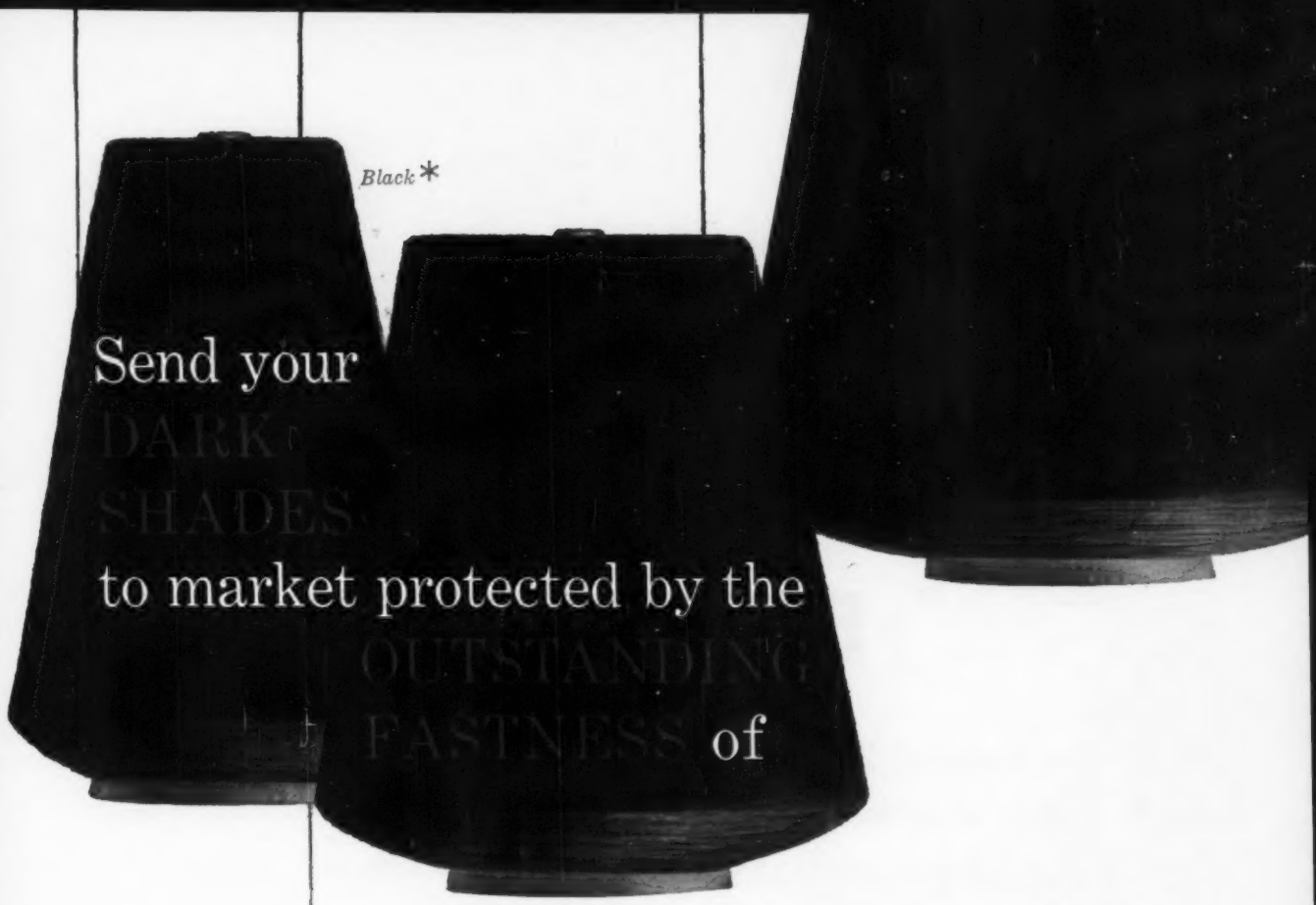

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Call in your Eastman representative to tell you all about the performance advantages and economy of these dyes

Darker shades of polyester fabrics and their blends are more in demand than ever.

In step with this trend, Eastman offers an expanding series of polyester dyes, providing the best all 'round fastness characteristics of polyester dyes currently available.

Specifically developed for use with polyester fibers, these dyes exhibit outstanding fastness to washing, light, sublimation, crocking, perspiration, dry cleaning and wet pressing.

Equally important are their excellent processing characteristics...good build-up, good exhaustion and outstanding leveling properties. Thus, blacks, charcoals, navies and browns are economically obtained.

Dyeing with Eastman Polyester Dyes is easily accomplished with carriers or under pressure at elevated temperatures. Fibers can be readily dyed in tow, tops, stock, or fabric forms. Fabrics of polyester filament can be conveniently dyed in jigs. Fabrics woven of spun polyester yarns alone or blended with cotton, viscose or wool can be easily dyed in dye-becks.

Get the full story of this outstanding line of dyes for polyester fabrics from your Eastman representative.

Eastman Polyester Dyes

Eastman Polyester Dyes are sold in the United States by EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of EASTMAN KODAK COMPANY, in Kingsport, Tennessee; Lodi, New Jersey; and Greensboro, North Carolina. On the West Coast through WILSON & GEO. MEYER & COMPANY, San Francisco, Los Angeles, Portland, Seattle, Salt Lake City. In Canada through CLOUGH DYESTUFF CO., LTD., St. Laurent, P. Q.

BULLETIN:

On August 27, 1960, Shell Chemical originated tank truck shipments of hydrogen peroxide in the South to save your company money regardless of its size.

If you are presently buying in drums, read how you can eliminate drum deposits and take advantage of low bulk prices on quantities of 1000 gallons or more.

If you're already buying in bulk, read how Shell Chemical's over-the-road delivery can lower your inventory costs and give you faster service at no increase in price.

THANKS to Shell Chemical, you can now buy hydrogen peroxide throughout the South at *tank car prices* and *over-the-road* convenience.

How drum users save

If you are presently buying 35% or 50% hydrogen peroxide in drums, you can save two ways.

Let's assume your current consumption is 40 drums a month of 35%. The immediate benefit from Shell's tank truck delivery is a $1600.00 increase in working capital by eliminating drum deposits. At the same time you will do away with the bookkeeping, handling and general nuisance of returning drums.

Major benefit: $4500 a year

But the major benefit, of course, is to give you low bulk prices *even if you don't have a railroad siding.* You can buy in quantities of as low as 1000 gallons a shipment. Again using 40 drums of 35% a month, your cash savings can amount to over $4500 a year. At this rate you could pay for excellent storage facilities in 8 months. Everything after that would be pure gravy.

How present bulk users save

Now let's assume you're already buying in bulk. What can Shell's tank truck delivery do for you?

First, it can free 1500 gallons of working capital every time you buy. Instead of taking 4000 gallons at a time, you can take 2500 *at the same low price.* Or you can take as little as 1000 at a very modest increase. Figure for yourself what this can mean in the course of a year.

Every part of the South

The second advantage to current bulk users is faster delivery. Even the most remote part of the South is within two days' drive from Shell Chemical's hydrogen peroxide plant in Norco, Louisiana.

Storage help from Shell

If you do not have storage facilities, you can buy the best on the market for about $3,000. Shell will help you with every step of the installation. That's part of the original tank truck plan as Shell conceived it.

For complete information, contact Shell Chemical's district office in Houston (CApital 2-1181) or Atlanta (JAckson 5-7621). Call today. The tank trucks are rolling. Let them roll your way with savings.

A Bulletin from

Shell Chemical Company

SHELL

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provide vat-dye permanence with direct application

ALGOSOL dyes are readily water-soluble and avoid time-consuming preparation...present attractive vat shades in simplified application...dye with superior penetration, levelness, and shade control...yield colorfast dyeings and prints.

Suitable for most types of dyeing equipment, Algosol dyes bring—to cottons, wools, rayons, and synthetics—outstanding vat-fastness to sunlight, washing, bleaching, and rubbing.

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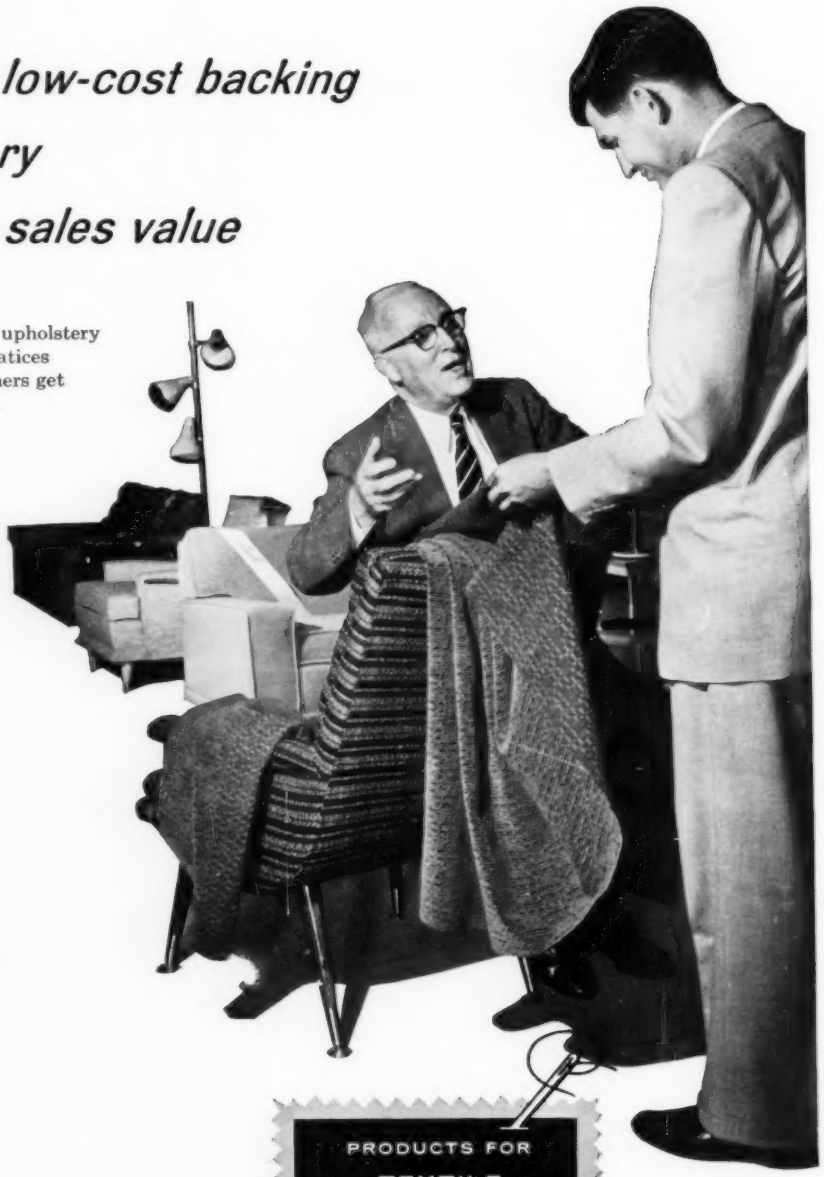
News about

B.F.Goodrich Chemical *raw materials*

Here's low-cost backing for upholstery to boost sales value



You can really process for profit with upholstery backings based on Geon® or Hycar® latices or combinations of both. Your customers get important manufacturing advantages and *their* customers get appealing product features.

For example, you can tailor the backing to give the "hand" you want with any fabric construction. These backings will also improve shape retention—make it easier to get the right fit without distorting the fabric. At the same time, they provide the extra selling advantages of dimensional stability and greater resistance to wrinkling, raveling, tearing and snagging.

Best of all, these coatings will really last. Tests show they won't discolor or stiffen even after aging, cleaning, or exposure to heat and light. They go on easily to stay on permanently.

Here's another example of the service you can get to provide better fabrics for wider appeal, at lower cost. For information, write Dept. PG-3, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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B.F.Goodrich Chemical Company
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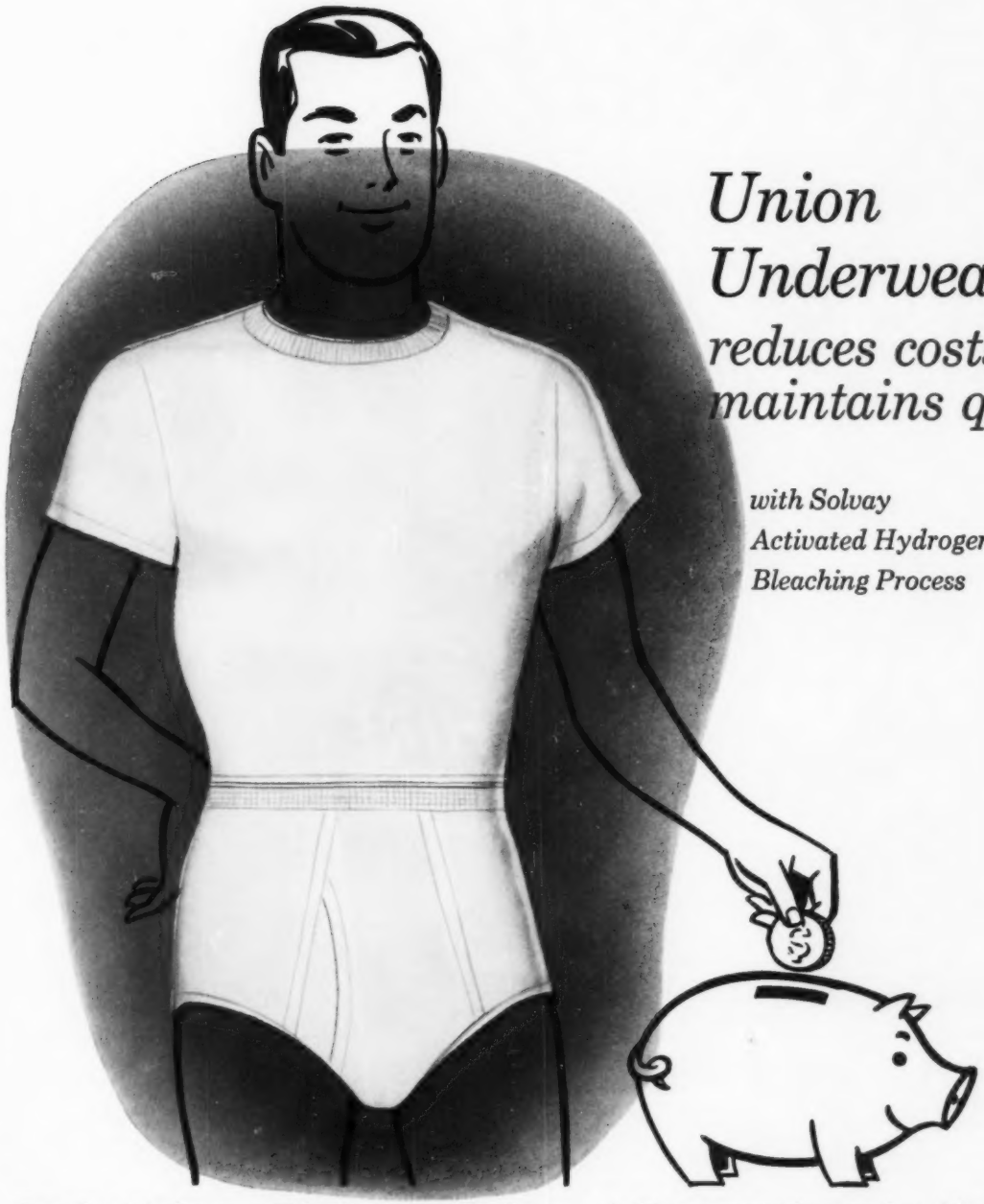

Union Underwear reduces costs... maintains quality

with Solvay Activated Hydrogen Peroxide Bleaching Process

Over the past nine years Union Underwear Co., Inc.—licensed manufacturers of "Fruit-of-the-Loom" brand underwear—has maintained their quality standard without increasing prices. An important factor in this improved manufacturing efficiency was their adoption of the *Solvay Activated Hydrogen Peroxide Bleaching Process.*

The Solvay Activated Hydrogen Peroxide Bleaching Process is a new method for bleaching cotton developed by Allied Chemical Corporation and available under a royalty-free license. This new process can give you whites equal to your present process with an important decrease in costs . . . consumption of hydrogen peroxide and additives can be reduced 25 to 50% depending on purity of cotton before bleaching. Or, you can achieve whiter whites at no increase in cost.

Solvay can provide technical service to help you evaluate this new process for your plant. A booklet is available from Solvay which describes application, advantages, cost analysis and comparative quality . . . full details on the techniques and results you can expect. Write today for your free copy of "Solvay Activated Hydrogen Peroxide Bleaching Process for Cotton."

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Performing SEAL

The famous metal clasp, that locks the lid on each Berkshire drum, is a *different* kind of seal. It's a pledge and a safeguard of integrity — a promise that the product it secures will perform as represented. Back of that promise is a combination of technical talent and physical facilities you should get to know better.

Berkshire COLOR & CHEMICAL CO.

Organized to know your dyeing problems — Equipped to solve them!

WHY IT PAYS YOU TO DEAL WITH BERKSHIRE —

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- Completely Unified Manufacturing Plant — from Basic Chemicals — thru Intermediate to Finished Product
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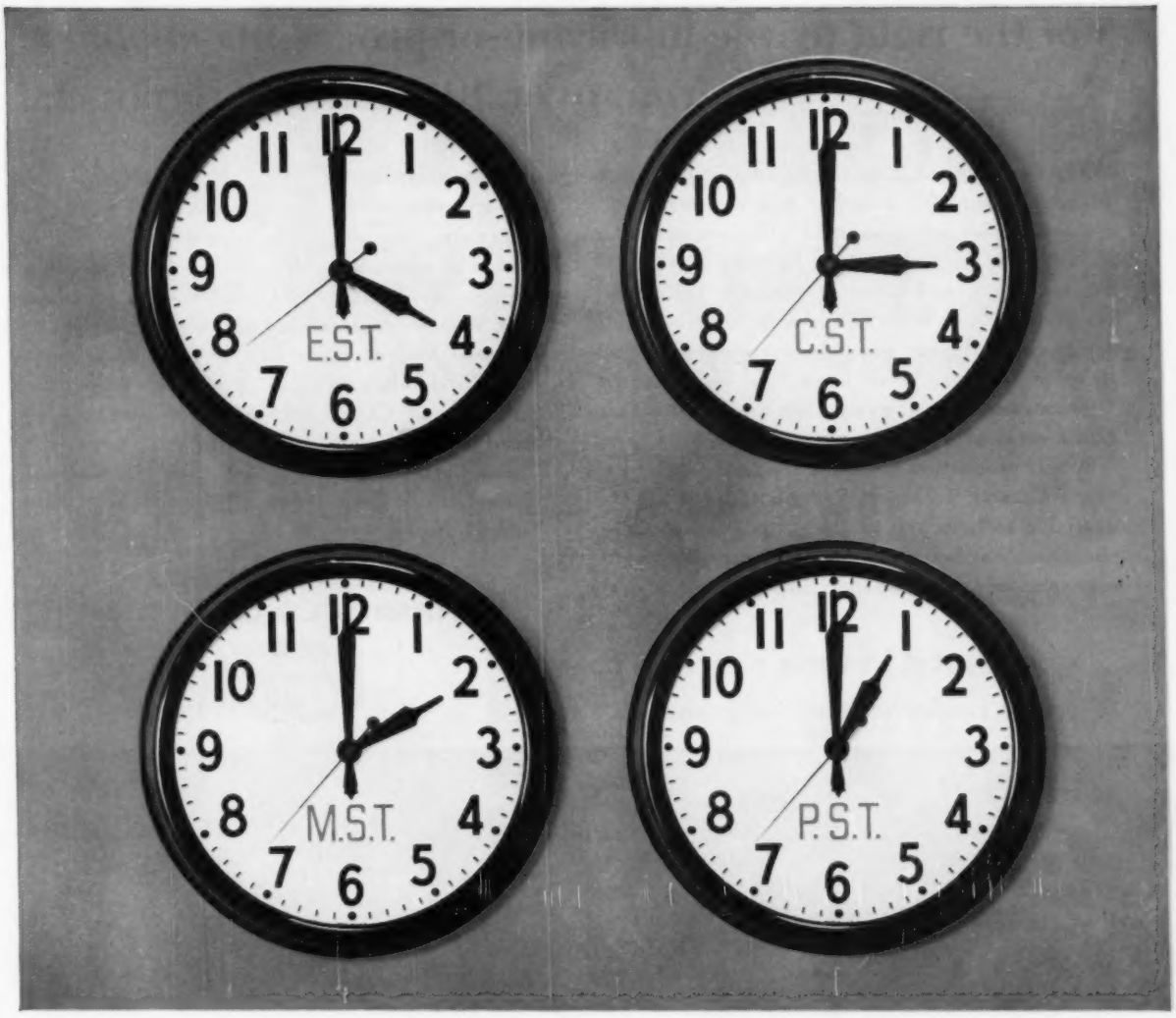

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Wherever your plant is located, whatever salt you need and whenever you need it, Morton, America's only nation-wide salt company, can provide you with the kind of salt and service to keep your brinemaking equipment working at top efficiency!

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AMERICAN
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DEVOTED TO TEXTILE WET-PROCESSING

contents

VOLUME 50 March 6, 1961 NUMBER 5

specially contributed

Studies in Wrinkle-resistance Finishes for Cotton Textiles. III. An Accelerated Storage Test for "Wash-and Wear" Cotton Fabrics 21 (163)
Richard L Arceneaux, Gloria A Gautreaux, Robert M Reinhardt and J David Reid

Consumer Complaints: A Source of Information for Producers 25 (167)
Samuel L Myers

aatcc proceedings

Maximum Construction Tables for Fabrics of Creslan Acrylic Fiber and Other Fibers 31 (P171)
H C Haller

The Importance of Odor Control in Textile Processing 35 (P175)
Breckinridge K Tremaine

Executive Committee Selected for '61 Convention .. 40 (P180)
Activities of the Local Sections 41 (P181)
Certificates of Service Awarded 45 (P185)
AATCC Calendar 45 (P185)
Membership Applications 46 (P186)
Elected to Membership 47 (P187)
Technical Manual in Error on Drycleaning Test 47 (P187)
Employment Register 48 (P188)
Future Papers 48 (P188)
Nominations for Harold C Chapin Award 48 (P188)

departments

Abstracts 52 (190)
ADR News Report 57 (191)
New Products and Developments 64 (196)
General Calendar of Coming Events 66 (198)
Personalities in the News 68 (199)

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Contents of previous issues can be found by consulting the Service and Technology Index and the Engineering Index, at your library

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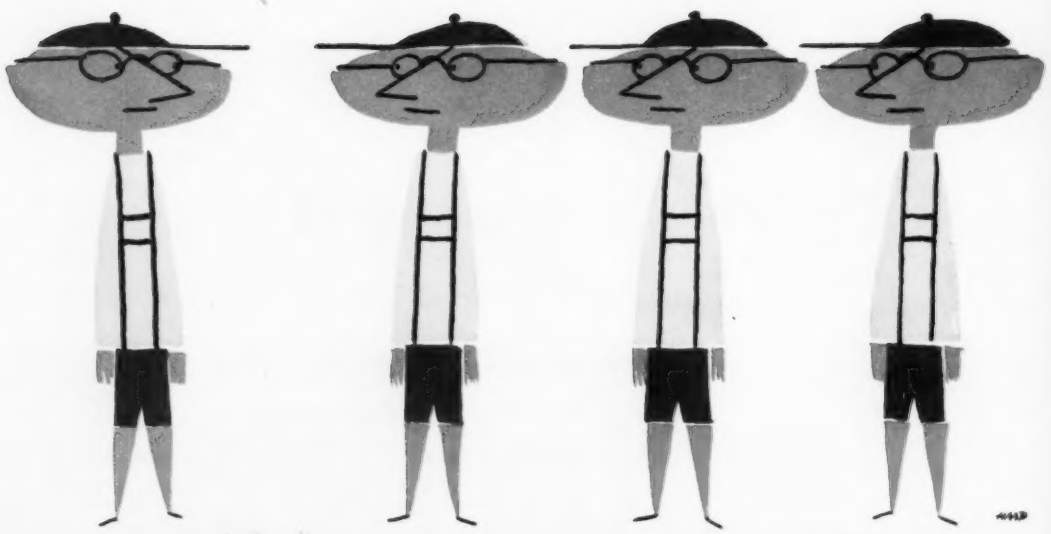

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DEVOTED EXCLUSIVELY TO TEXTILE WET PROCESSING

ADR

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An accelerated test procedure to determine the effect of storage on "wash-and-wear" cotton fabrics was developed. Fabrics finished with five N-methylol finishing agents, each with three different catalysts, were stored for 16 hours in sealed jars at 60°C and 100% relative humidity. The effects produced were comparable to those of prolonged normal storage. Optimum test conditions were established by determining the effect of storage time and temperature on fabrics finished with dimethylol ethyleneurea and zinc nitrate catalyst.

STUDIES OF WRINKLE-RESISTANCE FINISHES FOR COTTON TEXTILES

III. An Accelerated Storage Test for "Wash-and-Wear" Cotton Fabrics

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New Orleans, La

INTRODUCTION

A previous article in this series (*1*) reported on the degradative effects of storage on the properties of cotton finished with several wrinkle-resistance agents. Failure to wash the fabric after curing caused loss of valuable performance properties. Earlier articles by a number of investigators (*2, 3, 4*) discussed the dangers of not afterwashing; however, this work was on dimethylol ethyleneurea (DMEU) finished fabric. In one of these articles, Smith (*4*) suggested that an accelerated test would be of value in obtaining a rapid assessment of the effect of storage on finished fabric. He proposed a test in which fabric was stored in an oven with high humidity for 16 hours at 80°C. He used the test to evaluate fabrics treated with DMEU and various catalysts.

Attempts by the authors to duplicate Smith's results were unsuccessful perhaps because of somewhat dissimilar experimental conditions. The conditions of Smith's test were varied to obtain conditions which correlated better with normal storage. The new test conditions were then applied to finishes derived from other common N-methylol finishing agents.

MATERIALS AND METHODS

Fabric used was a desized, caustic-boiled and bleached 80 × 80 white cotton print cloth, 3.2 oz/sq yd. Treatments were carried out as follows: The fabric was padded to a wet pickup of about 75% with a solution of finishing agent and catalyst. The fabric, mounted on pin frames at original dimensions, was dried at 60°C for seven minutes and cured for three minutes at 160°C in an electric oven with circulating air. Following the curing step, some samples, as noted in the text, were washed at 100°F, with a solution of approximately 0.03% of a nonionic detergent of the alkylarylpolyether alcohol type, at a pH of about 10, in an automatic home washer using the modern fabrics cycle. After the wash, the samples were tumble-dried and air-equilibrated. Some samples, as noted in the text, were not washed after curing.

The finishing agents used were:

Dimethylol ethyleneurea (DMEU). This material, commercially available as a 50% solution, was applied to fabric from a 9% pad bath.

Urea-Formaldehyde (UF). A precondensate of one mole of urea and 1.6 moles of formaldehyde was prepared and stored for 24 hours in the laboratory and then applied to fabric from a 14% pad bath.

Dimethylol ethyltriazone (DMET). The preparation used was obtained from a commercial source as a 45% solution. It was reportedly a "pure" triazone in that it was not blended with urea-formaldehyde as some commercial products are. It was applied to fabric from a 9% pad bath which also contained emulsified polyethylene.

Dimethylol hexahydropyrimidinone (DMP). This relatively new agent, available in experimental quantities from a commercial source, was obtained as a 50% solution and was applied from a 7.5% pad bath.

Methylated methylolmelamine (MMF). This material, a methylated trimethylolmelamine precondensate, was obtained commercially as an 80% sirup. It was applied from a 9% pad bath.

The catalysts employed were zinc nitrate, used at 0.5% bath concentration, magnesium chloride used as 16% of finishing agent solids concentration, and an alkanolamine hydrochloride used as 3.5% of finishing agent solids.

Nitrogen content of samples was determined by the Kjeldahl method.

[1]One of the laboratories of the Southern Utilization Research and Development Division, Agricultural Research Service, U S Department of Agriculture.

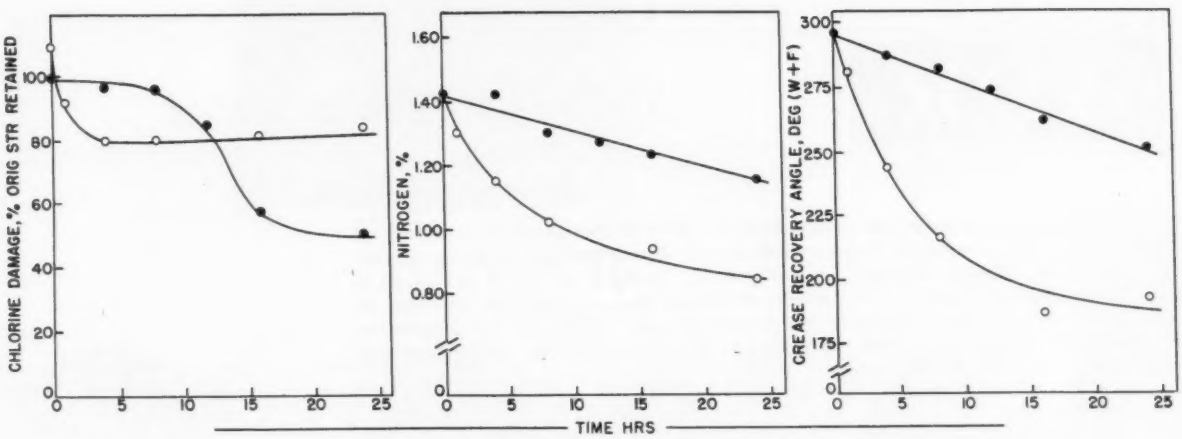

Figure 1

Effect of time of storage at 80°C and 100% relative humidity on chlorine damage, nitrogen content, and crease recovery angle of cotton fabric treated with DMEU-Zn$(NO_3)_2$; samples washed after curing (●) and samples not washed after curing (○).

Physical testing was performed by standard methods at 70°F and 65% relative humidity. Crease recovery angles were determined on the Monsanto Tester (5).

The AATCC "scorch test" method was used to determine damage caused by retained chlorine (6). Results are reported as percent of the original strength retained after scorching.

All samples were washed after accelerated storage to avoid hydrolysis during the delay period before testing.

EXPERIMENTAL AND DISCUSSION

Samples of fabric treated with DMEU using zinc nitrate and magnesium chloride catalysts were subjected to an accelerated storage test similar to that suggested by Smith (4). Samples were hung in an oven at 80°C for 16 hours with humidity maintained by a large beaker of water placed in the oven. Results of tests performed on the samples, both washed and not washed after curing, are shown in Table I, in the section labeled "oven storage." However, little or no change was observed in fabric properties. A forced-draft oven was used to obtain good control of temperature, and it was concluded that conditions of high humidity were not obtained. To insure high humidity, similar samples (approximately one foot square) were sealed individually in all-glass pint jars with a vial containing 10 ml of distilled water. The jars were placed in the oven at 80°C for 16 hours. These conditions duplicated those previously used in an investigation of the production of formaldehyde on storage (7).

As shown in Table I the more humid conditions produced greater changes than were observed in the first experiments. Also, different results were obtained with different catalysts. The data for the unwashed fabrics treated with DMEU-zinc nitrate show that the fabric loses nitrogen and wrinkle resistance. The chlorine damage, however, is less than that of the washed sample. The samples finished using magnesium chloride catalyst showed better correlation with normal storage results. A previous investigation had shown (1) that normal storage of unwashed fabric caused hydrolysis of the finish with consequent decreased chlorine resistance, decreased wrinkle resistance, and loss of nitrogen on washing.

Because of the results obtained with DMEU-zinc nitrate-treated fabric, similar samples were subjected to the jar storage test for times of 0 to 24 hours at 80°C. Figure 1 shows the effect of storage time at this temperature on the crease recovery angle, nitrogen content, and chlorine resistance of the samples.

The plots of the crease recovery angles and nitrogen content of the washed samples show the change to be linear with time. Whereas the rates of change of the unwashed samples were higher initially, they decreased with time. This indicates that hydrolysis of the finish of the washed sample is an insufficiently catalyzed reaction while the hydrolysis of the unwashed sample is catalyzed by the residual catalyst present. Although these results seemed reasonable, those of the scorch test were anomalous as compared with normal storage (1). The curves show that an unwashed

TABLE I

Comparison of accelerated storage tests[1]

Treatment	Chlorine damage, % orig str retained		Crease recovery angle, deg (W+F)		Nitrogen %	
	Unwashed	Washed	Unwashed	Washed	Unwashed	Washed
Original						
DMEU-Zn $(NO_3)_2$	—	100	—	286	—	1.43
DMEU-Mg Cl_2	—	98	—	284	—	1.33
Oven Storage[2]						
DMEU-Zn $(NO_3)_2$	99	97	279	284	1.39	1.36
DMEU-Mg Cl_2	75	93	278	275	1.31	1.32
Jar Storage[3]						
DMEU-Zn $(NO_3)_2$	81	57	187	262	0.94	1.23
DMEU-$MgCl_2$	43	69	218	274	0.90	1.32

[1] Half of each sample was washed immediately after curing and the other half was not. Both were washed after storage to avoid hydrolysis during the delay period before testing.
[2] Samples hung in oven at 80°C for 16 hours. Beaker of water was present to maintain humidity.
[3] Samples placed in glass jars with a vial of water and stored in oven for 16 hours at 80°C.

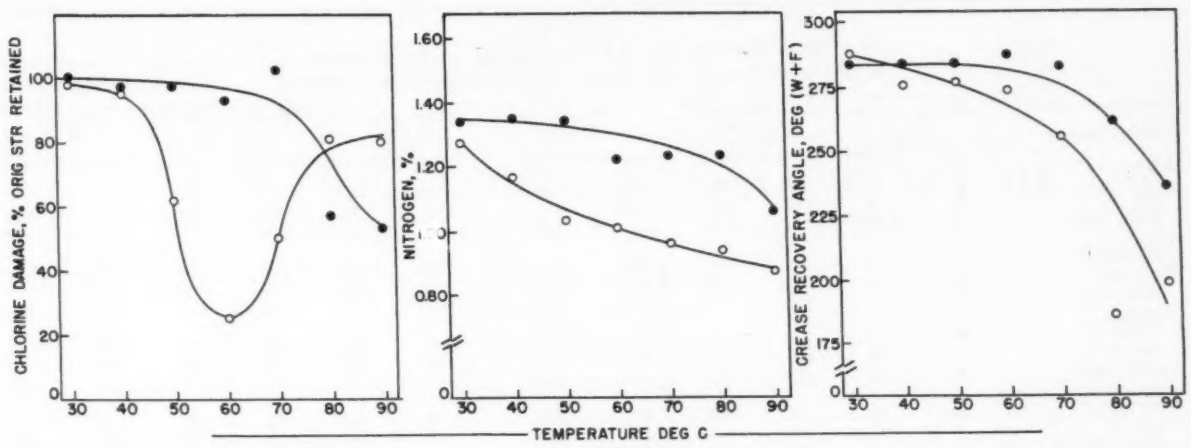

Figure 2

Effect of temperature of storage at 100% relative humidity for 16 hours on chlorine damage, nitrogen content, and crease recovery angle of cotton fabric treated with DMEU-Zn$(NO_3)_2$; samples washed after curing (●) and samples not washed after curing (○).

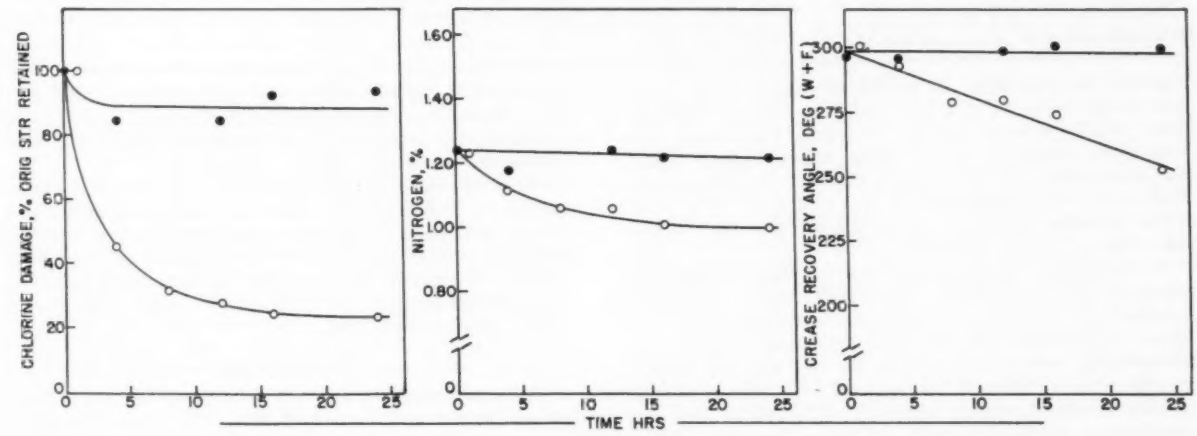

Figure 3

Effect of time of storage at 60°C and 100% relative humidity on chlorine damage, nitrogen content, and crease recovery angle of cotton fabric treated with DMEU-Zn$(NO_3)_2$; samples washed after curing (●) and samples not washed after curing (○).

sample lost about 20% of its breaking strength after only four hours; however, no further loss occurred in times up to 24 hours. The washed samples did not show chlorine damage until after eight hours of storage after which the rate of damage increased sharply and leveled off at about 50% strength loss after 16 hours. The results indicate that these accelerated conditions do not accurately reflect the effects of normal storage.

Accordingly, the effect of different temperatures between 30 and 90°C were investigated using the sealed jars for 16 hours of storage. The effects on the properties of cloth finished with DMEU-zinc nitrate are shown in Figure 2.

The samples of washed fabric stored below 70°C showed little or no chlorine damage whereas samples stored at 80 and 90°C showed about 50% strength loss in the scorch test. Chlorine damage of the unwashed fabric reached a maximum in the 50-70°C range. Below these temperatures there was little change in chlorine resistance and at higher temperatures the strength loss was only about 20%.

Although the scorch damage of the unwashed samples was not as great at 70-90°C, the breaking strengths were higher before scorching than they were before storage, indicating more extensive hydrolysis of the finish. This is borne out by the decreased nitrogen content and wrinkle resistance of the samples.

Whereas the washed samples did show losses in nitrogen content and wrinkle resistance at the higher temperatures, the losses were not as great as those of the unwashed samples. The shape of these curves was verified by a replicate experiment.

These data indicated that storage at 60°C produced results most consistent with those of normal storage. Therefore, a time study at 60°C was conducted. The results of this experiment (Figure 3) indicated the relative stability of the finish of washed fabric when subjected to storage at this temperature for times up to 24 hours. This stability may be contrasted with that of similar samples stored at 80°C (Figure 1).

In the 60°C storage test, with unwashed samples the most dramatic change occurred in resistance to chlorine damage. After only four hours of storage, strength retention in the scorch test was less than 50%. The maximum strength loss was reached after 16 hours of storage.

Comparison of the data for both washed and un-

TABLE II

Effect of accelerated and of normal storage on the properties of cotton fabric treated with various finishing agent-catalyst systems

Finishing Agent—Catalyst System	Accelerated Storage[1]						Normal Storage[2]					
	Chlorine damage, % orig str retained		Crease recovery angle, deg (W+F)		Nitrogen %		Chlorine damage, % orig str retained		Crease recovery angle, deg (W+F)		Nitrogen %	
	Unwashed	Washed	Unwashed	Washed	Unwashed	Washed	Unwashed	Washed	Unwashed	Washed	Unwashed	Washed
DMEU—												
$Zn(NO_3)_2$	25	93	257	288	1.07	1.36	46	100	277	286	1.24	1.43
$Mg\ Cl_2$	34	88	269	287	1.10	1.35	65	98	273	284	1.37	1.33
$RNH_2 \cdot HCl$	35	97	257	286	1.10	1.31	62	94	279	279	1.35	1.39
UF—												
$Zn(NO_3)_2$	40	69	276	295	3.10	3.08	52	66	286	288	2.96	3.03
$Mg\ Cl_2$	18	29	252	277	2.32	2.28	40	45	273	273	2.34	2.66
$RNH_2 \cdot HCl$	43	63	261	278	2.92	2.97	54	52	281	291	3.10	3.22
DMET—												
$Zn(NO_3)_2$	82	93	259	284	1.04	1.25	80	92	288	287	1.00	1.14
$Mg\ Cl_2$	81	89	266	283	0.94	1.06	94	85	257	268	1.03	1.06
$RNH_2 \cdot HCl$	80	87	279	265	1.00	1.13	77	77	267	271	1.10	1.14
DMP—												
$Zn(NO_3)_2$	90	94	228	274	0.72	1.09	97	96	225	266	0.77	1.02
$Mg\ Cl_2$	83	93	229	281	0.73	0.99	89	94	238	262	0.78	0.93
$RNH_2 \cdot HCl$	85	97	255	274	0.80	1.02	89	85	236	252	0.88	0.95
MMF—												
$Zn(NO_3)_2$	91	92	270	292	2.43	2.46	103	95	250	271	2.36	2.47
$Mg\ Cl_2$	96	95	254	278	2.41	2.40	90	100	251	267	2.27	2.30
$RNH_2 \cdot HCl$	94	96	258	278	2.35	2.43	95	93	257	270	2.45	2.48

[1] Samples placed in glass jars with a vial of water and stored in oven for 16 hrs at 60°C. Half of each sample was washed immediately after curing and the other half was not. Both were washed after storage to avoid hydrolysis during the delay period before testing.

[2] Samples stored for 35 days at 70°F and 65% relative humidity (*1*).

washed samples after 16 hours of storage with those previously reported (*1*) for normal storage of DMEU-zinc nitrate-treated fabrics indicated that these accelerated conditions gave results approximately comparable to those of 30 or more days of normal storage. Therefore, the conditions of 16 hours at 60°C and 100% relative humidity were selected for testing the response of other finishes.

Cotton fabric finished with five commonly used N-methylol agents—DMEU, UF, DMET, DMP, and MMF—each applied with three different catalysts— zinc nitrate, magnesuim chloride and an alkanolamine hydrochloride—were subjected to the test and the results are shown in Table II. In general, the test produced results similar to those obtained under actual storage conditions. Washed samples after accelerated storage had properties essentially equal to those of fabrics prior to storage. The properties of unwashed fabrics, however, were adversely affected by storage. Although the unwashed DMET, DMP and MMF samples showed little or no change in chlorine resistance, there was a general decrease in wrinkle resistance after storage. The unwashed DMEU, DMET and DMP samples also decreased in nitrogen content whereas the UF and MMF samples had the same nitrogen content as the washed samples.

The above results showed that all the unwashed samples underwent hydrolysis regardless of the catalyst used in the finishing treatment. These results can be explained by considering the reaction of these agents with cellulose and the products formed. The reaction of these agents with cellulose is reversible under acid conditions:

$$\text{Cell-OH} + \text{HOCH}_2\text{N}\diagup\diagdown \rightleftharpoons \text{Cell-OCH}_2\text{N}\diagup\diagdown + \text{H}_2\text{O}$$

At the curing temperatures, reaction equilibrium is shifted to the right due to the removal of water. In the complete absence of water, the reaction is not reversible even with catalyst present. However, finished fabric will regain water when stored in a normal atmosphere and unless the acidic catalyst residues are removed or neutralized (*1, 2, 3, 4*), this moisture is sufficient to permit hydrolysis of the "wash-and-wear" finish with consequent detrimental effects to the fabric. When the catalyst has been removed, the reverse (hydrolytic) reaction is insufficiently catalyzed and therefore too slow to be of consequence.

Thus a valid accelerated test requires conditions which will exert little effect on washed samples but which will produce the decreased performance characteristics usually encountered after storage of unwashed fabric. With this in view, the conditions selected for accelerated storage are those of 16 hours at 60°C and 100% relative humidity.

SUMMARY

An accelerated storage test procedure for "wash-and-wear" cotton fabrics treated with N-methylol finishing agents has been devised. In this test, a sample of treated cloth, approximately one foot square, is sealed in an all-glass pint jar with a vial containing 10 ml of water and the jar is heated in an oven at 60°C for 16 hours. Fabrics finished with five N-methylol agents, each with three catalysts, were subjected to the accelerated storage test and the results compared with those obtained by prolonged normal storage.

The accelerated test produced effects on crease recovery angles, nitrogen content after washing, and resistance to the chlorine scorch test believed to be closely comparable to those obtained with prolonged normal storage.

ACKNOWLEDGMENTS

The authors wish to express their thanks to the following for assistance in this study: to Harold P Pastor for Kjeldahl nitrogen analyses, to Julia M Sloan and Henry A Allen for crease recovery angle determinations, and to George I Pittman for drawing the figures.

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Some years ago, while conducting post-doctoral research at Harvard University, the author began collecting data on consumer complaints. Recently, with the assistance of Albert E Johnson and Joseph R Wiebush of the National Institute of Drycleaning, he completed this study to indicate the usefulness of the work of the AATCC Committee on End Use Performance of Textiles.

CONSUMER COMPLAINTS: A SOURCE OF INFORMATION FOR PRODUCERS

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INTRODUCTION

THE American economic system is a proper counterpart of the American political system. It is an economic democracy. The wishes of the consumers are relayed through the market mechanism to producers whose very survival in the long run depends largely upon their being responsive to the wants of the consumers. Even the most aggressive forms of advertisement are not a substitute for responding to consumer demand. Sales promotion can only stimulate, not "create," consumer demand. Sudden shifts in the competitive position of entire industries, with accompanying economic waste, have frequently resulted when business firms responded sluggishly to the dictates of consumers.

Consumer surveys, motivation research studies, mathematical models, and purchase anticipation analyses are research tools that have been used with increasing frequency in recent years to obtain information about consumer attitudes, desires, and buying intentions. An additional source of information for producer guidance concerning consumer demand is the data compiled by testing laboratories concerning consumer complaints. Each year, large numbers of consumers return merchandise to laundries, drycleaners, department stores, mail-order houses, and manufacturers with complaints that the merchandise has failed prematurely. Some of these firms submit this returned merchandise to testing laboratories to obtain objective information concerning the causes of the merchandise failure.

At the present time, the number of firms that submit returned merchandise to laboratories for scientific analyses is relatively small. Many retailers consider the analyzing of consumer complaints to be a *post mortum* operation. Many department stores, plagued by high overhead costs, consider the maintenance of a testing laboratory a luxury. Furthermore, it is well established that the ultimate adjustment that is made depends more upon such factors as the ire of the consumer or the profitability of retaining an account than upon the justifiability of the complaint. Therefore, why incur the additional cost of evaluating the returned merchandise in a laboratory?

There are, however, reasons why many laboratories are maintained. Retailers that develop private labels or that purchase many items by specification find the maintenance of a testing laboratory indispensable. Many manufacturers maintain laboratories for product development and quality control. The additional function of studying consumer complaints is usually performed by such laboratories. The necessity of adjudicating complaints, the desire to provide additional customer services, or the desire to tie in product testing with advertising are other reasons that account for the development and maintenance of commercial and retail laboratories. Finally, there are laboratories, such as those maintained by the National Institute of Drycleaning, whose special function is that of analyzing consumer complaints for member firms.

The data coming forth from these laboratories are at present only fragmentary. Nevertheless, an analysis of even these fragmentary data appears to reveal clearly defined categories of problems relating to textiles. More important, an analysis of these data suggests that here is a rich, almost untapped, source of information to guide producers in their quest for profits and the economy in its quest for efficiency. This further suggests that the efforts of the AATCC Committee on End Use Performance of Textiles to coordinate the activities of various laboratories should be continued.

The findings upon which the conclusions of this study are based were arrived at by visiting and studying the test data available in six department store laboratories, one mail-order laboratory and one trade association laboratory. The data for the seven retail testing laboratories apply to the year 1953. The data for the trade association laboratory apply to the year 1959.

EXPERIMENTAL

The techniques used by all of these laboratories are remarkably similar. The merchandise returned by dissatisfied customers is usually examined with care. Undamaged parts often serve as a base of comparison. The laboratory technicians use various chemical, physical, and performance tests to determne whether the product failure is traceable to misuse or abuse of the merchandise by the consumer, or whether the failure is traceable to inherent defects of the merchandise.

The first fact to be noted about the laboratory evaluation of returned merchandise is that the number of complaints studied in any given laboratory is relatively small. The data in Table I indicate that the median number of items of merchandise examined in the seven retail laboratories visited was 904.

Filene's, whose laboratory handled 5888 items, examined the largest number of items among the retail firms. The trade association laboratory handles approximately twenty-one thousand problems per year. When these complaints are related to the total flow of merchandise, they are infinitesimally small. The number of complaints handled in a department store laboratory is, furthermore, only a small proportion of the

TABLE I

Number of customer complaints of unsatisfactory merchandise appraised by sponsor of laboratory and justifiability of complaints, 1953

Sponsors of Laboratory	Number	Justifiable Merchandise at fault		Unjustifiable Customer at fault	
		Number	Percent	Number	Percent
Wm Filene & Sons, Boston	5888	3110	52.8	2778	47.2
Macy's, New York	1333	516	38.7	817	61.3
Gimbel Bros Philadelphia	1002	422	42.1	580	57.9
Kaufmann's, Pittsburgh	904	323	35.7	581	64.3
R H Stearns, Boston	595	224	37.6	371	62.4
J C Penney, New York	551	267	48.5	284	51.5
Saks, New York	358	129	36.0	229	64.0

merchandise returned to the department store. In addition, only a small proportion of the complaints studied by laboratory technicians may actually undergo laboratory test. Jules Labarthe, who was for many years a Senior Fellow at the Mellon Institute in Pittsburgh, where merchandise returns of the Kaufmann Department Store were analyzed, has indicated that only ten percent of the returned items examined were actually seen in the laboratory. The other ninety percent were judged by inspection in the store.

In spite of the fact that the number of complaints is very small, the consensus is that these data are of special significance as clues to the existence of broader problems. Jules Labarthe has said, "I think it would be far healthier if we were to regard the individual customer complaints as being an indication of an imminent storm of resentment about the way in which our textile customers feel that they have been treated." (*1*).

A dramatic case study that demonstrates the possible repercussion of consumer complaints is that of complaints concerning women's acetate blouses. For many years blouses, next to dresses, accounted for the largest percentage of customer complaints in the six department store laboratories that were visited. The chief complaint was that of scorching, holes from hot irons, and the like, most of which were traceable to fusing of the acetate filaments. These complaints were so numerous that in many departments the personnel were trained to recognize this type of failure and were instructed to make an adjustment without sending the blouses to the laboratory. Invariably, these failures traceable to fusing were considered not justifiable.

It might appear that, since the failure of these blouses was not traceable to inherent defects of the merchandise, the makers could ignore the complaints. Subsequent events, however, proved that if they did, they should not have. Census of Manufactures data indicate that in 1947, of 12,049,000 dozen women's blouses that were cut, 3,985,000 dozens, or 33.1% were cotton blouses; 6,514,000 dozen, or 54.6%, were rayon and acetate blouses. In 1954, of 12,686,000 dozen women's blouses that were cut, 6,569,000 dozens, or 51.8%, were cotton. Only 1,757,000 dozens, or 13.8% were rayon and acetate. During this period, cotton had increased by 1,584,000 dozens, or by 39.7%; rayon and acetate had decreased by 4,757,000 dozens, or by 73%. Undoubtedly, such a dramatic shift in the competitive position of these two fibers was related, among other factors, to the unpleasant experiences of consumers with the latter. The numerous complaints of consumers, though adjudged not justifiable, proved to be a signal of an impending storm. Consumer complaints then, whether justifiable or not justifiable, are a clue that industry might well heed.

It has been noted that the various testing laboratories make a distribution of consumer complaints into two categories. Complaints are considered *not justifiable* if the failure is traceable to misuse or abuse by the consumer of the merchandise in use, in care, or in storage. Complaints are considered *justifiable* if the merchandise failure is traceable to inherent defects in the garment construction, finish, or dimensional stability or to defects of the component elements of the good.

The determination of the category into which a complaint shall fall is usually relatively simple. An excess of chlorine bleach, for example, would suggest abuse in laundering. Residue of the chemicals usually found in deodorants and cold wave solutions would be a clue to other merchandise failures that were caused by consumers. Frequently, the laboratory technican in the department store orders from stock a new item identical with that returned by the customer. The old and the new are then compared to determine any changes in dimensions. At times, the new items are also laundered and subjected to other accelerated tests to determine whether the stretching or shrinkage about which the consumer complained is traceable to improper handling. Frequently, swatches of fabric taken from inner seams are subjected to accelerated tests in the Fade-Ometer to appraise the resistance of the dyes to color failure. In some instances, even the laboratory personnel serve as guinea pigs to determine whether certain dyes and finishes irritate human skin. On the basis of these and other tests, a decision is reached in most cases as to whether the customer or merchandise was to blame for the failure.

The data in Table I indicate the number and percentage of items ruled as consumer-caused failures by seven laboratories. Typically, the percentage of failures traceable to the consumer was greater than that traceable to the merchandise itself. The data suggest that approximately 60% of failures are traceable to consumer use or consumer-use conditions rather than to the merchandise itself. The rather close agreement of the various laboratories on this percentage is somewhat remarkable when the diversity of philospohy of the various laboratories is considered. This may be explained by contrasting typical test reports of Macy's of New York with test reports of others. Macy's Bureau of Standards occupies a key position in the department store. If an item of merchandise is tested and found to be below the quality considered desirable, the Bureau of Standards simply submits a report with the words "Merchandise Disapproved" stamped in red. Departments are then prohibited from selling additional items from the given lot. The underlying philosophy is apparently that the customer's complaint is justifiable if he is sold merchandise whose performance is unreasonably poor. In addition, it appears that adjustment is recommended if the customer was not warned beforehand concerning characteristic shortcomings of the merchandise.

Test reports reveal several items on which adjustments were recommended and whose further sale was banned because they fell below reasonable performance levels. Umbrellas whose color bled were ordered discontinued. Cotton corduroy raincoats were ordered removed from stock because they were not considered suitable for their intended use. The sale of umbrellas whose ribs rusted was suspended. Specified acetate and rayon taffeta fabrics were ruled to be below acceptable quality and were disapproved for continued sale. Excess localized wear of nylon-reinforced woolen socks was a valid basis for adjustment, ruled the laboratory, "because the 5% nylon reinforcement was not enough."

In other cases, after adjudging the complaints of customers justifiable, the continued sale of the items was approved only if they carried caution tags warning consumers of the poor performance of the goods. Camel-hair fleece coats, for example, were considered to have given the consumer the normal wear expected of this type of coat; however, adjustment was recommended because the customers had not been warned that the fabric in these coats was not durable. A caution tag was thereafter to be attached to these coats. Similar action was taken concerning cashmere sweaters. In addition to carrying information concerning the poor wearing qualities of cashmere, the caution tags were to contain information concerning the brushing of these sweaters. The complaints of customers that blouses containing acetate were susceptable to gas fading were ruled justifiable. The seller was immediately notified that a caution tag would have to be inserted in these garments if they were to be sold at Macy's. Veiling found to be highly inflammable in two seconds was required to be labeled "dangerously inflammable." Similarly, complaints were adjudged justifiable concerning socks that bled, pajamas that wet crocked, a wool shirt that would shrink unless washed by hand, a V-type poodle cloth of poor wearing quality, and other items. The continued sale of these items was approved, however, provided they carried caution tags warning customers of the shortcomings.

Differences in testing philosophy exist among various laboratories. Some, to cite just one of many possible examples, consider fume fading to be "characteristic." The complaints concerning this failure are therefore ruled to be not justifiable. Other laboratories consider it almost inexcusable for producers to market fabrics that fume fade.

The divergence of views of the various laboratories is probably greatest concerning the handling of complaints about bathing suits. The most important single complaint concerning bathing suits is color failure, primarily sun fading. An analysis of 86 complaints concerning bathing suits returned to Gimbel's reveals that 45, or over 50%, of these complaints concerned color failure. The fifteen complaints concerning poor wearability constitute only 18.2% of total complaints, a poor second.

The importance of color failures is even more pronounced when they are considered in relation to those failures rated justifiable. According to Gimbel's grouping of complaints as justifiable or not justifiable, exactly one-half of all bathing suits complaints were justifiable. Color failures constituted 37 or 86% of the 43 justifiable complaints. Sun fading, in turn, accounted for 24, or 64.9%, of these 37 color failures.

Bathing suit manufacturers are aware of this problem. Indeed, in many cases, labels appear on these garments clearly stating that they are not guaranteed for colorfastness. In general, manufacturers adamantly refuse to make refunds on these items which are returned because of color failure. This means that if retailers grant a refund, they must bear the loss. This constitutes a dilemma for the laboratory; for a ruling that the complaint is justifiable is tantamount to a recommendation that the customer's money be refunded.

Laboratories accordingly differ in their views concerning the rating of this complaint. The following extract from a Filene report presents one point of view: "The conditions of use of bathing suits are so severe that the customer cannot expect the colors to stand up." Such complaints are adjudged not justifiable. The laboratory testing for Gimbel took a different position in a similar case: "A new garment similar to the customer's bathing suit was submitted . . . Tests disclosed that there is a definite color change after 40 hours exposure simulated sunlight. Although the label on the garment states that the fabric cannot be guaranteed for sunfastness, we feel that the complaint is justifiable because of the fact that the garment must be used in sunlight."

These differences in the philosophies of various laboratories, in the policies of handling specific types of complaints, and in the views concerning the expected serviceability of specific items definitely point up the necessity for the implementation of a consciously conceived program of coordination among the laboratories. Only if such coordination is effected will data, statistically valid and free of bias, be forthcoming.

Nevertheless, available data from various laboratories, fragmentary and rough as they are, do give a highly consistent picture concerning major problem areas in textiles. Statistical refinements will undoubtedly enable one to pinpoint the causes of textile failures more precisely; however, it is hardly likely that they will invalidate the broad generalizations derived from currently available data.

The generalization that a majority of textile failures are traceable to factors other than inherent merchandise defects is one that deserves to be repeated and emphasized; for it clearly suggests that any program of action designed to improve textile performance must be directed toward improving the textile consumer as well as the textiles to be consumed. There are those who have apparently overlooked this. Some groups, for example, that have promoted labeling and fiber identification apparently have begun with the assumption that all merchandise failures are traceable to the merchandise itself.

Understanding the important role of the consumer in causing textile failures is likewise essential in organizing, promoting, or even appraising textile labeling programs. If such programs as the Textile Products Fiber Identification Act of 1960, for example, are considered as measures to protect producers and consumers against economic deception, they are meritorious. However, if one seeks a textile labeling program that is designed to promote economic efficiency and to enhance consumer satisfaction with textiles, such programs emphasizing fiber identification are likely to be found wanting. They ignore the fundamental fact that most textile failures are traceable to the consumer, not to the fiber or fabric.

Consumer complaints are observable manifestations of the operation of forces that may have serious repercussions on industry. It appears to matter little whether the complaints are traceable to inherent merchandise defects or not. If the consumer is experiencing difficulty, trouble is ahead for producers. To effect a program of corrective action, however, a distinction must first be made between justifiable and nonjustifiable complaints. Each of these categories must be separately analyzed. It is only then that the specific sources of the difficulties may be revealed.

Of the various laboratories whose data serve as the basis of this report, only the National Institute of Drycleaning has data available in sufficient volume and detail to make possible extended analysis. The following analysis, then, is based largely on the data of that laboratory. However, summary data are cited from other laboratories. Invariably, these corroborate the basic conclusions derived from the data of the National

Institute of Drycleaning.

The first conclusion drawn from these data is consistent with that which has already been discussed at length. Textile failures traceable to consumer use and consumer maintenance conditions far outnumber those that are traceable to the textile themselves. Of the 21,709 textile failures studied at the National Institute of Drycleaning in 1959, only 7916, or 36.5%, were traceable to defective fabrics or to failures of other materials in the garments.

In 8888, or 40.9%, of the cases, it was ruled that the failure was caused directly by consumers; in 4,168, or 19.2%, of the cases, by drycleaners. If these are combined to constitute a category comparable to the nonjustifiable grouping of complaints by the department store laboratories, then 13,056, or 60.1%, were adjudged "nonjustifiable." In 737, or 3.4%, of the cases, the cause of failure was unkown.

JUSTIFIABLE COMPLAINTS

Failures for which the fabric or garments were responsible may be analyzed first. Defective buttons, shoulder pads, linings and interlinings, and other materials used in garments accounted for merely 506 of the 7,916 justifiable complaints; therefore, they are ignored in this analysis. Attention is focused on fabric failures which constituted 7,410, or 93.6%, of the justifiable complaints.

COLOR FAILURE———Among problems relating to fabric-caused failures, color failure ranks first. Indeed, no other fabric defect closely approaches poor colorfastness in seriousness as a textile problem. Color failures constitute 3,482, or 47.0%, of the 7,410 textile failures for which producers are to blame. There is, furthermore, the suggestion that other failures, such as fabric damages resulting from dye tendering or use of light-sensitive dyes, are fundamentally color failures. Thus, this percentage of fabric breakdown ruled to be from color failures, as great as it is, may even have a downward bias. This importance of color loss as a factor making for textile failure is borne out by data from the department store laboratories. In every instance color failures accounted for the largest percentage of justifiable complaints.

Almost a third (1,112, or 31.9%) of the 3,482 problems that the National Institute of Drycleaning traced to color failures arose because the dyes were solvent soluble. Sun fading accounted for 623, or 17.9%, of the 3,482 color failures. Acid and fume fading accounted for 514, or 14.8%. The use of water-soluble dyes accounted for another 128, or 3.7%. If more detailed data were available from department stores, to which a larger number of washable items are returned, the greater importance of water-soluble dyes as a cause of color failure would probably be shown.

FABRIC DAMAGES———The second most important category of textile failures for which producers are responsible is fabric damages. Damaged fabrics accounted for 2,457 failures, one-third of the 7,410 "justifiable" complaints. Two types of failures, in turn, dominate this category, tendered curtains and draperies and silk splits. Curtains and draperies that deteriorated from exposure to sunlight and atmosphere accounted for 959, or 39.0%, of the 2,457 justifiable cases of fabric damages. Silk splits accounted for 750, or 30.5%. Albert E Johnson, director of trade relations of the National Institute of Drycleaning, recognizes this to be another manifestation of the color failure problem:

"In the Fabric Failure category, sunlight is the major condition causing failure . . . It is interesting to note that low resistance of textile fibers to sunlight is the largest single cause of damage complaints of the total complaints received to date, yet no standard methods exist for evaluating the suitability of a textile fiber for use in window curtain and drapery classification. Nor does the curtain and drapery classification in the ASA L-22 standards contain a reference to a sunlight resistance requirement, doubtless because of the lack of a testing method." (3).

The "silk split" problem arises because of the difference in the tensile strength of the silk yarns and that of the other fibers (for example, nylon) with which the silk is woven. This problem, according to Joseph R Wiebush, director of research of the National Institute of Drycleaning, has stubbornly resisted solution. This, in turn, suggests implications concerning the difficulties that lie ahead. As the trend toward the increasing use of fiber blends continues, a greater number of "problems of innovations" may be expected to arise. At the same time, greater difficulties will likely be encountered in pinpointing the source to which the difficulties should be traced and from which corrective action should be expected.

DIMENSIONAL INSTABILITY AND DAMAGES TO FINISH———Distant third and fourth as categories of failures for which producers are responsible are dimensional instablility and damages to finish. The 587 cases of dimensional instability, consisting primarily of shrinkage, accounted for only 7.9% of producer-caused failures. This is probably a slight understatement. Since the National Institute of Drycleaning does not have ready access to new merchandise for comparison, no decision can be made in many cases as to whether shrinkage was caused by the consumer or the fabric. Nevertheless, even after this downward bias is allowed for, failures such as shrinkage and stretching would not assume the major proportions of problems such as color failure.

The 548 damages to finish, constituting 7.4% of the 7,410 "justifiable" problems, are also relatively minor.

UNJUSTIFIABLE COMPLAINTS

Since consumers are more often to blame for textile failures than the textile themselves, it is especially important to uncover those conditions of consumer use that make for these failures. It will be recalled that of the 13,056 failures that were considered nonjustifiable, 8,888, or two-thirds, were traceable directly to the consumer; 4,168, or one-third, to drycleaners. Attention may first be directed to those failures for which the consumer himself was directly responsible.

DAMAGE FROM STAINS———The most important type of textile breakdown caused by the consumer is damage from stains. Fully one-third (2,965) of the 8,888 consumer-induced failures were the result of stains. Food beverages accounted for one-half (1,494) of these 2,965 stains. Caramelized sugar, in turn, accounted for over one-half (791) of the 1,494 food beverage stains.

Albert E Johnson has given explicit expression to the importance of stains as a major complaint:

"It is apparent that the mysterious chemical reactions of commonplace substances when in contact with textiles are a considerable source of misunderstanding. The largest, single cause of this type of

(*continued on page 51*)

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PROCEEDINGS

American Association of Textile Chemists and Colorists

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March 6, 1961 No. 5

1960 National Convention———

MAXIMUM CONSTRUCTION TABLES

For Fabrics of Creslan Acrylic Fiber and Other Fibers*

H C HALLER

Manager, Fibers Application Laboratory

Fibers Division

American Cyanamid Co

The whole field of clothing and fabrication started when "Boy Met Girl," going back to the original man and woman, Adam and Eve. Somewhere along the line, the need was found to get themselves clothed, so, according to the "Good Book", the fig leaf became the first article of clothing.

We can visualize Adam reaching up and picking four fig leaves. Thus, he became the first stylist, engineering the difference between the two needs—three units for the lady and one for himself. Nothing is mentioned as to the way in which these units were applied, and it is doubtful that at that time the local shopping center had anything comparable to Scotch tape.

It must have been quite some time later when one of the new bevy of girls, looking around and noting that everyone wore the same style and costume, said to her particular Adam: "I want something new and different to wear. And besides, I'm chilly." Here perhaps began the business of the fur coat, and it would seem that the first time in man's history, he stole in order to provide his wife with a fur coat. In this case, the stealing would have been from the original owner and would have, to say the least, left the owner embarrassed, if not somewhat fatally affected.

At another period of history, it is likely that woman, while toying with a group of loose fibers, observed that they could be twisted and spun into a thread or yarn. She then figured out how to enmesh the yarns into a cloth, and the beginning of weaving occurred. The cloth was then sewed together to form a garment. Now the burden of clothing the family fell to the woman.

However, Adam's successors are probably not so smart because, rather than leaving this situation alone, men must have felt: "Anything you can do, I can do better." And with this, he began to make more complicated weaves—with finer yarns. He soon got his old job back.

Eventually, the more modern looms were developed. And, from here on, progress is noted, bringing us to the present-day thinking—where weaving is now done in endless styles and a multitude of fabric constructions.

INTRODUCTION

THERE was a time when the fabric designer's life was relatively simple, and uncomplicated. Dealing with known materials, the cotton and the flax of the field, the wool of the sheep, the silk of the worm, he learned to know them as he knew his friends, from intimate association and recognition of their peculiarities, their faults and their attributes. Experience equipped him for the task of converting these fibers commercially into useful and decorative fabrics.

Today there are available so many new fibers with so widely different physical properties that the most ambitious fabric designer cannot gain adequate knowledge of their behavior by attending the time-honored School of Experience, alone. Fabric construction limits, or the maximum combination of ends and picks of given yarns, which have been established for the natural fibers, no longer apply when yarns spun from fibers with different specific gravities are used.

The ideas and plans of the fabric designer are limited by the techniques and economics of production; he must be sufficiently familiar with these to avoid impossible, unnecessarily difficult, or costly constructions. Trial and error methods have produced the data necessary for intelligent fabric designing, but experience is time, a commodity in short supply in today's commerce, and made expensive by the pressures of competition.

Empirical traditions are not to be scorned, but alone they form a poor basis for progress into new fields with unfamiliar materials, nor do they suffice for the modern methods of production. What is needed is a universal system of textile technology which reduces all fabrics to the bare parameters which are essential for their description and prediction.

Appreciating this need and the dilemma of the fabric designer, American Cyanamid Co sponsored a fabric engineering research project at the Textile Research Center, North Carolina State College.

Its purpose was to develop a simple general description of the basic forms of textile materials in idealized geometry. These theories have been reduced by the calculating power and speed of electronic computers to sets of prediction tables. These tables require no computation on the part of the fabric designer, and which relieve his mind of the burden of formulas.

To give you a thumbnail sketch of the amount of work which is ready for use, we have some 40,000 or better entries. These are distributed

*Presented October 6, 1960 at the National Conventon of the AATCC held at Philadelphia, Pa

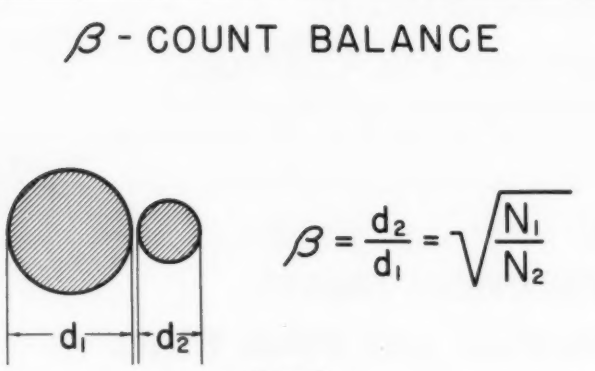


Figure 1
Count balance, or beta ratio

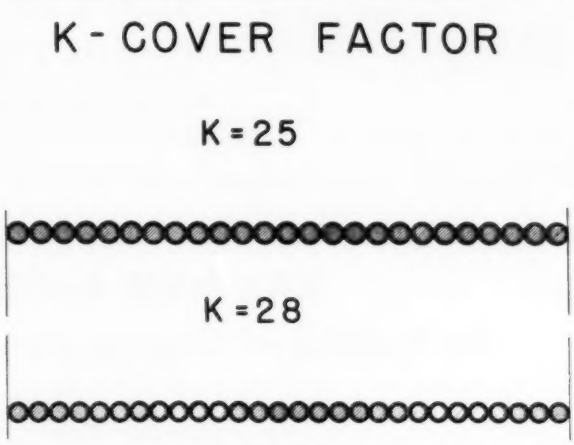


Figure 2
Graphical comparison of cover factors

over 115 pages of tables. This terrific amount of data represents a condensation over the amazing number of calculations required to get this particular boiled-down version.

DISCUSSION

The ideals of fabric engineering are purposeful design and prediction of behavior. A desirable practical result is an ability to predict construction limits, the maximum number of ends and picks per inch which can be woven with a given yarn, blend and weave.

Creslan[1] acrylic fibers, with their low specific gravity, weigh only ¾ as much as equal size cotton fibers. It follows, then, that yarns and fabrics containing Creslan acrylic fiber will have more bulk than equal weight cotton yarns and fabrics.

Attempts to duplicate literally the constructions of close cotton cloths with yarns containing Creslan acrylic fiber will lead to over-stressing of loom parts. Purposely, an attempt to exactly copy a cotton construction and substitute Creslan yarns resulted in actual loom breakage. The best instruction on how to win friends and influence people would fail to rescue a designer responsible for repetition of this performance. It is necessary to make proper corrections for the bulking power of Creslan acrylic fibers in order to achieve equivalent fabric cover.

F T Peirce, in his classical paper (4), reduced rigorous mathematical relationships to approximate forms involving such textile units as ends, picks, and yarn crimps. Love (2), Painter (3), and Adams *et al* (1) published graphical solutions to Peirce's system of equations for cloth geometry. It is the purpose of the present work to apply these mathematical relationships to yarns containing Creslan acrylic fiber and to present the results in the form of tables, which show the interrelationships of warp yarn number, filling yarn number and the combinations of maximum ends and picks per inch. Included in the system are the following tables:

I. Beta ratio, or count balance
II. Cover factors
III. Maximum fabric constructions for:
  A. Plain Weave
  B. Three-harness weaves
  C. Four-harness weaves
  D. Five-harness weaves

It is necessary to relate the count of size of the warp yarn to that of the filling yarn. A beta ratio has been developed which fills this need very well. Beta ratio, or count balance, is the ratio of the diameter of the warp yarn to that of the filling yarn. If warp and filling yarns are spun from the same fiber, then the beta ratio equals the square root of the warp yarn number divided by the square root of the filling yarn number, using the inverse yarn numbering system. Figure 1 shows the formula for arriving at a count balance. (The subscript *1* is used to denote warp and the subscript *2* to denote filling.) The diameter of the warp yarn is twice that of the filling yarn; the yarn number of the filling is four times that of the warp.

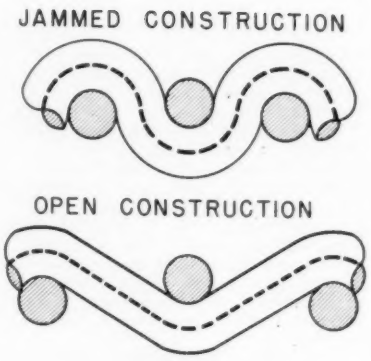


Figure 3
Graphical representation of jammed and open fabric constructions

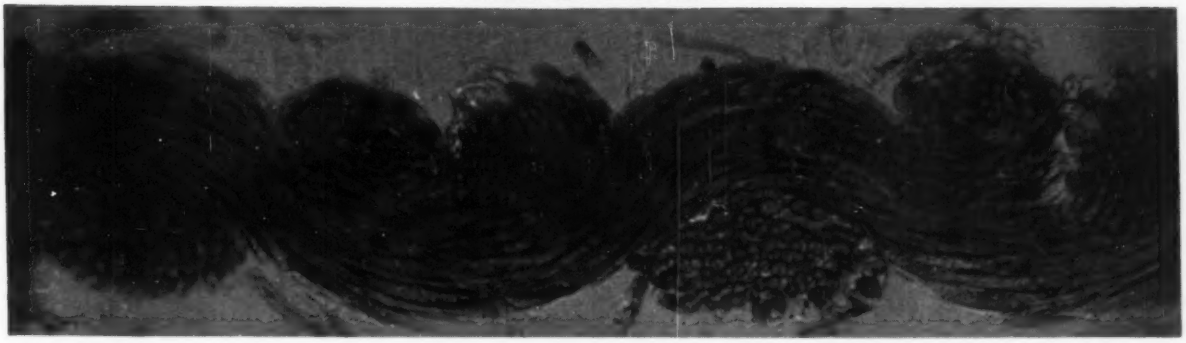
Figure 2 illustrates the meaning of cover factor. It is a measure of the degree of the compactness of a set of yarns in the fabric. If the yarn number is unity, then the maximum cover factor is equal to the number of yarns which can be laid side by side in a distance of one inch. This illustrates the meaning of cover factor for yarns containing Creslan acrylic fiber and also cotton. Twenty-five yarns containing Creslan acrylic fiber would occupy the same space as twenty-eight cotton yarns of the same weight. This means that one can get equivalent fabric cover with 10% fewer ends and picks when the yarns contain Creslan acrylic fiber. Mathematically, the cover factor, K, is the ratio of the number of ends or picks per inch to the square root of the yarn number.

A jammed construction is one which contains the maximum combination of ends and picks. Insertions of additional threads in either direction would result in a distortion of yarns. Figure 3 shows drawings illustrating the path of yarns in jammed and open constructions.

The jammed illustration shows continuous curvation of the one set of yarns. Additional yarns cannot be be forced into such a construction. In this case, additional yarns can be in-

[1]Registered trademark of American Cyanamid Co

PERPENDICULAR TO WARP



PERPENDICULAR TO FILLING

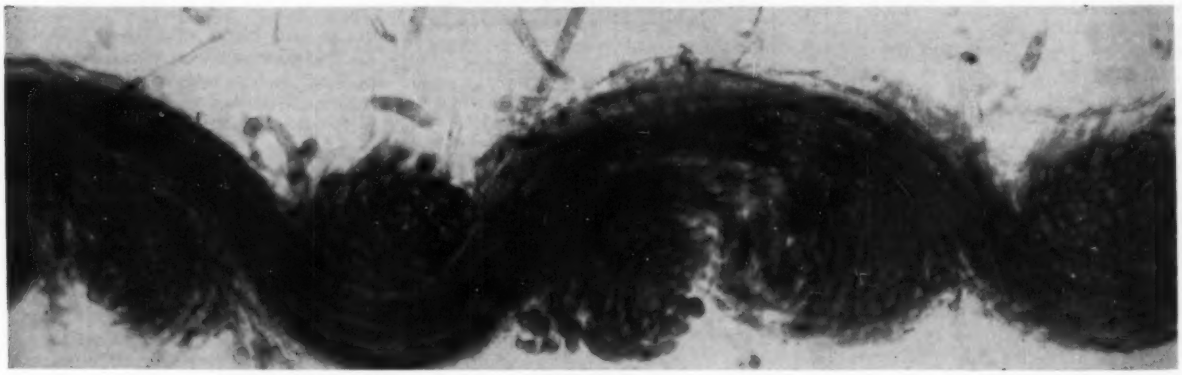


Figure 4
Photomicrographs of jammed fabric cross-sections

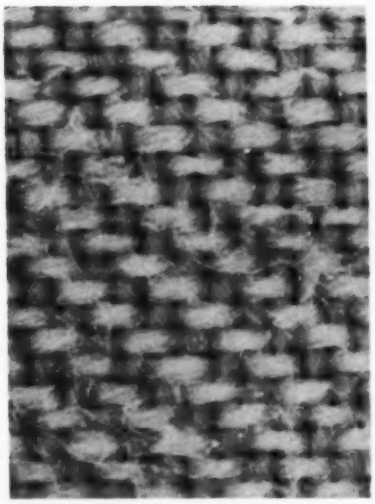


Figure 5
Plane view of jammed fabrics

troduced. This would then force yarn curvature as seen above.

Figure 4 shows actual fabric cross sections of a jammed or limiting 2/1 twill fabric woven of yarns containing Creslan acrylic fiber. It is very evident that no additional yarns can be forced into this construction. Figure 5 is a plane view of this same fabric. Here again, the fabric is compact, well filled. A number of variations of fabrics based on the tables and made of Creslan acrylic yarns have proved the values to be quite reliable.

Actually, these tables are not limited to use for acrylic fibers but can be applied to other fibers where the yarns are made of the same fiber type, both in warp and filling. The whole system is relative, so that there is really a great deal of freedom in the use of these charts or tables.

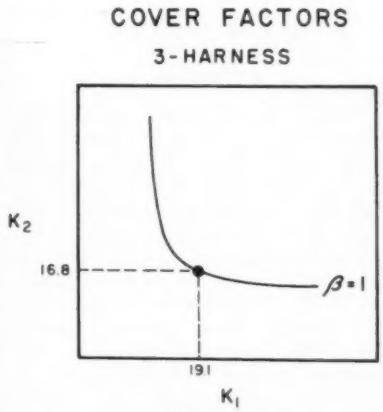


Figure 6
Relationship of warp and filling cover factors in jammed constructions

GIVEN:
PLAIN WEAVE
100% CRESLAN® ACRYLIC FIBER 3D 2"
WARP YARN NUMBER – 25
FILLING YARN NUMBER – 16^S
ENDS PER INCH – 60
DESIRED:
MAXIMUM PICKS PER INCH – ?

Figure 7
Example of a fabric design problem

USE OF TABLES[2]

Let us now select a problem for solution. Such an example is given in Figure 7. Its solution is easy with

[2]Single copies of the tables developed in connection with this paper can be obtained by mill management personnel from the Fibers Division, American Cyanamid Co, 111 West 40th St, New York 18, NY. Because of the limited supply of the tables, availability is confined to mill managers for distribution to their fabric design and development personnel.

BETA RATIO TABLE

FILLING YARN NO.	WARP YARN NUMBER 24	25	26
15	1.26	1.29	1.32
16	1.22	1.25	1.27
17	1.19	1.21	1.24

Figure 8
Use of beta ratio table

COVER FACTOR TABLE

THREADS PER INCH	YARN NUMBER 24	25	26
59	12.0	11.8	11.6
60	12.2	12.0	11.8
61	12.5	12.2	12.0

Figure 9
Use of cover factor table to find warp cover factor

MAXIMUM FABRIC CONSTRUCTION TABLES

$\beta = 1.25$

K_1	K_2
11.5	20.7
12.0	17.7
12.5	16.5

Figure 10
Use of maximum construction tables to find filling cover factor

COVER FACTOR TABLE

THREADS PER INCH	YARN NUMBER 15	16	17
70	18.1	17.5	17.0
71	18.3	17.8	17.2
72	18.6	18.0	17.5

Figure 11
Use of cover factor table to find maximum number of picks per inch

$$\text{Cover Factor, } K = \frac{T}{\sqrt{N}}$$

T = Ends or picks/inch
N = Yarn number

Figure 12

the use of engineering tables for fabrics containing Creslan acrylic fiber.

The first step involved here is to find the beta ratio. Figure 8 shows a small section of one whole beta ratio table, and where the two yarn numbers intersect, we find 1.25, the required value. This is found by referring to the beta ratio table where the two yarn numbers are sought and the point of intersection gives the required value. By inspection alone we see that the warp yarn is 25, its square root is 5. The filling yarn number is 16 and its square root is 4. Therefore, $5/4 = 1.25$

It can readily be seen that when we have problems not as easily extracted as the numbers 25 and 16, the tables can be of immense help. For example, try a rapid root extraction of yarn counts of 33 and 59. You'll *love* the tables!

Next, it is necessary to refer to the cover factor (Figure 9). Find the value which intersects for the yarn number 25 and threads per inch 60. This gives a value of 12. The next step is to use the maximum fabric construction tables (Figure 10). Here we look for the beta value of 1.25 and in this case the one related to the plain weave or two-harness. Running down the K_1 column, we find the value of 12 and opposite that in the K_2 column we find the value of 17.7.

Now, again referring to the cover factor tables (see Figure 11), we look for the yarn number 16 and under that heading move down to the cover factor of 17.8 and directly across to the left we read the number of threads per inch, which in this case is 71. The ease of determining the answer is now very evident.

For those who are further interested in the basis for calculating cover factor, Figure 12 gives this particular formula and, in addition, the maximum fabric construction formula is given in Figure 13. This calculation would have to be exercised for each yarn number, as well as harness variations.

$$\sqrt{1 - \left[\frac{w\left(\frac{25}{K_1} - 1\right) + 1}{1 + \beta}\right]^2} + \sqrt{1 - \left[\frac{\left\{w\left(\frac{25}{K_2} - 1\right) + 1\right\}\beta}{1 + \beta}\right]^2} = 1$$

Maximum Fabric Construction

Number of Harnesses	w
2	1
3	1.5
4	2.0
5	2.5

K_1 = warp cover factor
K_2 = filling cover factor

Figure 13

Figure 13, of course, is the one which really involves the "sweat and tears" type of thing. It can now readily be appreciated how much work has gone into the preparation of this tremendous amount of information which has been reduced to occupy a very small spot on the designer's table. We would like to acknowledge that this Herculean amount of work has been accomplished, under the direction of J F Bogdan, director of processing research at the Textile Research Center, School of Textiles at North Carolina State College. He was very ably assisted by Henry K C Woo, assistant to the director of processing research at the College.

It should be pointed out that a distinction in identification exists between the acrylic fiber sold by Cyanamid to the textile trade under the label Cyanamid acrylic fiber, and the fiber in fabrics and consumer products which bear the Creslan trademark. Cyanamid's acrylic fiber generally cannot be labeled Creslan until it is processed into finished fabrics or knit goods, and in this state has met quality and performance standards agreed to by Cyanamid and the textile processor. In other words, Creslan is a controlled trademark which may be used only on approved fabrics and final products.

SUMMARY

A set of engineering charts has been compiled which is useful in calculating limits for fabric construction.

When known yarn counts are used and either picks or ends are specified, the required number of yarns for the unknown can be found.

The system can be made flexible through corrections for different specific gravities of fibers. Knowledge of bulking properties of given yarns and fibers is helpful in applying the tables.

The data available could only be calculated economically through the use of electronic computers.

It is believed that the tables will be extremely helpful in the engineering of better fabrics, with greater economy of effort.

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1960 National Convention———

THE IMPORTANCE OF ODOR CONTROL IN TEXTILE PROCESSING*

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The sweetening of industry's breath with specially designed odor-control products is described, with particular emphasis on practical applications within the textile industry, abroad as well as in this country. Details are given covering odormetric measurement, selection of materials to meet both the chemical and physical requirements for stability, odor intensity and unit threshold values.

A section of this paper is also devoted to reodorization as practiced by many mills in overcoming the malodors associated with various resin finishes, and data covering such practice is enlarged upon. A section is also devoted to a report on data of public opinion concerning odor, expressed in a recent opinion survey covering an area involving some 10 states.

INTRODUCTION

SWEETENING of industry's breath with specially designed odor-control products (*1*) to improve employee and community relations has, in recent years, become a unit part of many new as well as older plant practices. In addition, such chemical products have also been employed for improving malodors often present in specially finished textile fabrics. This, of course, provides a direct consumer benefit and can enhance the sale of fabrics.

Therefore, it is our hope today to review for you both types of treatment utilizing odor-control products: first, those products that may be used for the treatment of waste itself; and secondly, those products designed to freshen finished textile fabrics. Likewise, we plan to tell you about the design of these products, how they are measured and used, and about the theory of odor itself.

DISCUSSION

INDUSTRIES—BIGGEST SOURCE OF EVIL SCENTS—I am sure that all of you are aware that waste in general, as you might expect, is industry's biggest source of evil scents. To control and eliminate this problem is of course paramount, and starts with good housekeeping itself. However, it is a costly business to accomplish, often requiring considerable capital investment beyond the reach of many operators, whether they be large or small. Consequently, with the development in the last few years of specially designed odor-control chemicals and their compounds, a more economical approach toward adequate control of an odor nuisance is possible. The use of such materials represents a cost of perhaps two to seven dollars per million gallons of waste, or a few cents per million CFM of airborne fumes released to atmosphere.

CRITICISM———It has been stated on numerous occasions that, when a local civic organization and newspapers aim pot shots at your plant or that of a neighbor, the management is the unit most exposed to such criticism. In the past, management avoided censure as best it could; it was felt that spending money on non-productive capital equipment, process changes and the use of treating chemicals was unnecessary; and that maximum production with minimum capital investment, without thought to air pollution, was the best approach.

Time has now shown that this attitude is not acceptable, for failure to cooperate on problems of air pollution cannot only destroy a plant's community relationship, but may result in local crusades against the plant, with perhaps restrictive legislation being enacted or a forced closing-down, with possible long drawn-out legal costs.

The ultimate cost, therefore, to the plant, can be a great deal more in the end than the cost of investing in adequate waste-control methods.

ODOR PERCEPTION ——— Time and time again, one is struck by how often odor is a subject for discussion. The perception of odor has never been fully explained—or at least no explanation has been universally adopted. It is known that odor is perceived by humans only when some substance is capable of exciting the nerves as it reaches the specialized tissue of the olfactory tract, and dissolves in the form of a liquid covering. Just how the nerves may transmit a characteristic sensation to the brain is an unsettled question; this falls under the science of *Olfaction*. Investigation in this field does not lead to easy success. Much of the lack of success is due to uncertainty in describing and classifying a known smell, to the difficulties of olfactometry for measurement of the degree and intensity of smell), to the inability to apply a yardstick to the similarities and differences of smells, and ultimately to the exclusive nature of the particular odor.

Regardless of the lags in the science of Olfaction from a theoretical point of view, we believe that odor sensations might be the results of chemical reaction or of vibrations within the molecules or parts of molecules of spectral absorption and radiation of energy.

It is certain that odor sensations depend on some substance reaching the olfactory tract. It cannot stay at a distance and still be perceived, as we perceive objects that are emitting light or sound. The olfactory tract is so located that ordinarily only gas and vapors reach it. Some, of course, of the many kinds of gases may fail to excite sensations in the tract. Those that do stimulate the olfactory nerves can be pleasant or unpleasant; and the unpleasant kind can often be traced to wastes—whether they be industrial, domestic, or an act of "mother Nature".

TEXTILE WASTES — SOURCES ———Recent listings in the Air Pollution Handbook (*2*), Section 1-53

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under "Non-Durable Goods Industries" list the sources of industrial contaminants as waste, under the heading of "Textiles", as "chiefly coarse particulates and organic compounds". However, today we know that the modern textile processor could just as well be classified in the section "Chemical and Allied Wastes", which includes inorganic chemicals as well as organic, and therefore covers fine solids, sulfur compounds, nitrogen compounds, oxygen compounds, etc. If we break these down further, we find that the textile wastes which contribute to odor involve such materials as vegetable and animal oils and their by-products, residual wastes of sulfur compounds, decomposition products of starches, various resin wastes (perhaps traceable to formaldehyde and urea), chlorine and chlorine derivatives, and perhaps many others which are not completely consumed within the fabric itself.

I am sure that the processor of textiles is well aware of the variable types of wastes and uses many methods to reduce and control such wastes, but occasionaly odors which are airborne are readily recognizable, even in dilution, so that complete control is not always possible with existing equipment. For example, it has been indicated that one pound of methyl mercaptan (3) could very well pollute one acre of area, perhaps to a height of 300 feet, and could easily be detected downwind as an odor describable as decayed cabbage, skunk, etc. Present-day methods of utilizing confinement with incineration, absorption, aeration, burial and, of recent date, the employment of water scrubbers seldom results in removing *all* of the malodor. The best approach is the use of both equipment and odor-control products.

THRESHOLD VALUES——Before we discuss these odor-control products of recent development, I refer you to Table I, which will give you some idea of the intensity of recognition threshold values of many chemicals which are known to have distinctive, and often malodorous, characteristics. The table (4) covers the concentrations (part per part of water), which are faintly but distinctly recognizable as hydrogen sulfide, methyl mercaptan, amyl mercaptan, methyl sulfide, orthochlorophenol, pine oil, ortho-creosol, camphor, carbon tetrachloride, and hydrocarbons as mineral spirits.

If these odors and their combinations form part of a waste problem, one can readily see that their threshold value assumes added importance. Thus it is imperative to review any industrial process where the odor is known to be objectionable before attempting any control method. Once the proper information is accumulated, it may then be possible to control the odors by spraying or vaporizing a selected odor-control product into the fumes from an operation, or adding products directly into a process whenever feasible. There is also the possibility of adding materials to scrubbing liquors or spreading them on contaminated surfaces. In any case, an early survey of an operation should include actual classification of the malodors involved and their odormetric measurement.

TABLE I

Chemicals	*Scent unit Parts per part of water (in descending order of odor content)*
Hydrogen sulfide	.004
Methyl mercaptan	.005
Amyl mercaptan	.007
Methyl sulfide	.01
O-Chlorophenol	.03
Pine oil	.80
O-Cresol	1.00
Camphor	3.00
Carbon tetrachloride	5.00
Mineral spirits	8.00

ODORMETRIC MEASUREMENT ——Odormetric measurement is not entirely a new art, but its adoption, in various forms, is new in its application to industrial malodors. The classical and most widely used method of odormetry is the comparison of odor strength, involving a small increment of an odorous gas or vapor, with clean odorless air until the first, and often indefinite, odor sensation is felt. Thus by taking samples of the various effluent wastes from an operation or collecting the fumes from such operations, it is possible to establish the amount of odor stimulus. This is referred to as the 'minimum perceptible' or 'threshold value.' Obviously it is often difficult to reproduce when using part per part of air, because of great dilution or the effect from absorption on surfaces and oxidation. Therefore we have found that odormetric measurement based on progressive dilution with water rather than air and a smell test of the air above the water provides more valuable and consistent results. This method is expressed as a concentration in parts of chemical in parts-per-part of water (5).

For example, let us select a known odor substance which we will call Product A. This product, at 0.1 ppm serves as a convenient daily standard. The intensity of sensation produced by Product A is such that it could permit not only the detection but recognition of the odor. From comparison it is then possible to select the best comparable treating chemical which may have equal or greater intensity to mask out Product A. Table I gives a better picture of how selected chemicals can be rated by the use of this system of odormetric measurement.

However, one must remember that a desirable odor-control product must meet other conditions of a chemical and physical nature before it is adequate for an intended application. For example, to abate and mask odors from sulfate pulping, severe requirements for chemical stability impose great restrictions on useful materials. A properly designed product has to be resistant to the action of some 5% caustic soda and 3% sodium sulfide in an autoclave at 170°C, besides having a very definite and high threshold value. Of only slightly less importance are the physical properties. An odor-control product must be designed to have the right vapor-pressure characteristics, which are vital for the proper coverage of the malodor being treated. In essence, a good odor-control agent should be liberated parallel with and in proportion to the malodor.

STABILITY REQUIREMENTS—— In the study of specially designed odor-control products for a particular malodor problem, it becomes important to note that, when employing two products of equal intensity, a very different reodorization effect may be produced. The modified odor might be less objectionable, unchanged or more objectionable than the original odor. Therefore, the designer of a suitable odor-control product must take this into consideration when formulating; the final compound might also have to be used in high dilution for a period of time. This is illustrated by Table II (6), which shows how the stability of Geraniol Extra solution is tested by storing various concentrations in water for a period of up to 50 days at room temperature, and then diluting further to establish the scent unit value for the aged solution. Dividing by the number of days of aging, the daily decrease in odor content can be estimated.

It is the author's hope that, from the data presented, it will be obvious to all that the masking concept, or

TABLE II
Geraniol Extra solutions

Concentration	Stability: Length of storage (days)	Stability: Decrease in odor content (%)
1% in methanol	50	1
1% in water	50	5
0.1% in water	50	5-10
100 ppm in water	12	80
10 ppm in water	12	100
one ppm in water	2	100

odor counteraction, as it is sometimes called, is not entirely a hit-or-miss affair.

MECHANISM OF ODOR CONTROL——Early work in the field of odor study has indicated that in masking, strong odors tend to cover weaker ones, and if the two odors are about equal strength, a blend of both can be observed and both may be identified. If one is considerably stronger than the other, it alone, as a rule, will be perceived. However, Von Bergen states that in the group benzene, toluene, xylene, pseudocumene and durene, combinations in the correct proportions can be produced which are almost odorless (*7*). The aim, therefore, of good odor control, whether by a form of odorless mechanism as above or by other means, is to produce as often as possible a "clean, fresh" odor to replace a malodor rather than strong perfume—in other words, a pleasant odor but not necessarily a rose, strawberry, etc. In any case, the various groups of odorous materials that can be used effectively today require the skill of trained people in their compounding, to obtain the best-designed products.

APPLICATIONS — NONTEXTILE ——In discussing the practical applications of odor-control products with a group such as this, it is important to consider the wide range of these applications as well as the mechanisms and measurements. Because the control of malodors is of interest to everyone, we would like to give you an example of the effectiveness of odor control in a process outside the textile field.

This process involves the use of alkylation sulfuric acid, a common by-product of refining alkylation processes, which, as you know, are quite attractive by virtue of their economy; but they do present an odor problem. This acid generally ranges from 80% to 90% sulfuric acid with a hydrocarbon content which may be as high as 5%. It contains other impurities, but the odor contributors are the high sulfides and the mercaptan content. Its main users are often producers of fertilizers (*8*), including ammonium phosphate. In a few cases, the alkylation acid is used to produce phosphoric acid, which is utilized in the production of phosphatic fertilizer, and feed-grade calcium phosphate either by calcination or precipitation. In any case, chemical fertilizer has a typical odor, varying in intensity according to the quality or percentage of alkylation acid in the finished product. The airborne odors of alkylation acid are always distinct. In processing, much heat is generated, as in the acidulation of phosphate rock. The abundance of C in the presence of heat reduces the H_2SO_4 to SO_2. Inorganic sulfides are emitted as H_2S with a possibility of additional amounts being formed by reduction with carbon. The odor given off, as in the acidulation of phosphate rock, contains, besides H_2S, constituents of SO_2, HF, SIF_4, and H_2SIF_6. These acid vapors themselves are very irritating to the eyes and nose. The presence of mercaptans also makes this problem a constant headache. As indicated earlier, the mercaptans have a very low threshold, even in great dilution, and ethyl mercaptan, for example, can be detected in air at a concentration as low as one part in fifty billion parts of air.

Working closely with the consumers of alkylation acids, both in laboratory as well as in plant, we designed a synthetic aromatic odor-control compound (*1*) capable of withstanding the extreme conditions of acidity and temperature, and this product was successfully used in the exhaust fumes at 800°F. For some unexplained reason it lessens eye and nose irritation and abates malodors. This type of product is employed directly into the process for phosphoric acid production at the primary reaction tanks, and benefits odors arising from the reaction tanks as well as from the launderers and filters, and from the evaporator exhausts. It is likewise employed in the ammoniation tanks in ammonium sulfate production and in the den mixer in super phosphate fertilizer.

This example will show you that bringing your problems to those directly concerned with the problems of odor study can result in designed products to meet some very chemically difficult situations. Of course the employment of any odor-control agent in the area of toxic gases must be kept at a level that will not entirely hide the identity of the toxic material, and must be in itself below government standard toxicity limits.

APPLICATIONS—TEXTILE——The application of odor-control products in the textile industry itself is best illustrated by several examples. It is not uncommon in England to directly treat processing liquors with specially designed odor-control products (*9*). Waste effluent from bleaching and dyeing may be treated with one to two ppm of a selected product dispersed in kerosene and proportionated at the point of outlet directly into the effluent. In France, sodium hydrosulfite from dye discharge solutions are treated with a 1% solution of a designed odor-control product, using 50 ppm based on the total discharge (*10*). The purpose of this treatment is to abate the odors of sulfites. Special odor-control products are also used for scouring liquors, which may contain chlorinated solvents as well as phenolics. Addition is made to the solvent make-up at 0.2%, and the degree of odor coverage is described as "excellent". For aqueous scouring emulsions containing strong pine-oil odors, good reodorization is possible using .05% to .10% of the odor-control product based on the weight of pine oil, as employed in the scouring mixture.

In the United States, quite a few textile firms have used such odor-control products as direct addition to effluent wastes, run to a pond or lagoon (*11*). The concentration required depends on the odor intensity of the waste itself. However, using one to three gallons of concentrated material per million gallons of waste is usually sufficient. The cost of such application is perhaps in the range of 30 to 70 cents per 100,000 gallons of waste effluent handled per day. Thus, approximately twenty-five special odor-control products have been designed, in keeping with the needs of the textile industry's waste problems (*12*). These include products for overcoming odors associated with amines, protein decomposition, phenolics, nitrogen compounds, waste chlorine as hypochlorites, gums, oils, acrylics, formaldehyde, sulfonated hydrocarbons, various esters, ketones hydrogenated and chlorinated solvents, aldehydes and sulfides.

HOW TEXTILE MALODORS DEVELOP———Such odors of chemical waste can be further visualized by the following review (*13*).

In bleaching, dyeing and printing operations, odors develop from:

1) Aerobic biological oxidation
2) Chemical coagulation and sedimentation
3) Drying or incineration
4) Lagooning
5) Salvage

In flax retting, odors develop from:

1) Aerobic biological oxidation
2) Chemical coagulation and sedimentation
3) Drying or incineration
4) Salvage

In synthetic fibers, odors develop from:

1) Aerobic biological oxidation
2) Chemical coagulation and sedimentation
3) Salvage

In wool scouring, odors develop from:

1) Aerobic biological oxidation
2) Chemical coagulation and sedimentation
3) Anerobic digestion
4) Salvage
5) Neutralization
6) Flocculation
7) Chlorination

RATING ODOR INTENSITY——— Naturally, those concerned with the problems of waste may be interested to know that ratings of a malodor, particularly its intensity, are possible once the chemical nature of the odor is known. Take, for example, the data shown in Table III. This represents government work conducted some years ago by the Naval Research Laboratories (*14*), where it was found that, by spraying 0.6 ml of various esters in alcohol solution into a room, the intensity of the odor could be determined according to the following scale:

Numerical Degree	*Intensity*	*Description*
0	no odor	none
1	very faint	minimum but positive
2	faint	weak but positive
3	readily noticeable	moderate odor
4	strong	forcible
5	very strong	intense—may bite or sting

A series of tests was conducted using this scale, and after each intensity test the time of clearing from the room was noted; in no case was this over five minutes. Results of the tests are shown in Table III.

The reason for including this table in this review was to again point out that it is possible to rate various chemicals and thus use them towards the correction of problems. It does not always hold true that only a pleasant-smelling material will serve to correct the odor of an unpleasant material. Often very foul odors, such as those represented by the butyrates, can be used to offset an odor nuisance.

TABLE III

Odor characteristics of esters

Ester	*Number of straight chain carbon atoms in ester*	*Persistency in time units of three minutes*	*Intensity*	*Foulness*
Iso-Amyl acetate	6	9	2	pleasant
N-Propyl propionate	6	6	3—	"
I-Propyl propionate	5	9	3+	"
I-Butyl propionate	6	8	3—	"
I-Amyl propionate	7	9	2	"
N-Propyl butyrate	7	11	3—	foul
N-Butyl butyrate	8	9	3	"
I-Butyl butyrate	7	7	2	semipleasant
I-Butyl I-valerate	8	13	3	"
I-Amyl butyrate	7	9	4—	foul
I-Amyl I-valerate	8	12	4	"
N-Butyl caproate	10	15 (lingers)	4—	"
N-Amyl N-caproate	11	11	3—	"
I-Amyl N-caproate	10	7	2+	semifoul

PRODUCT REODORIZATION——The employment of these new odor-control products can also be directed toward the processing of textiles. One chemist, charged with taking the "mal" out of industrial malodors, explains it as follows:

"A manufacturer who puts nose appeal in his products or in the odors around his plant will build good will that rings the cash register and keeps his neighbors happy."

Therefore, we present to you today an example of fabric odor control which can be obtained with treated urea-formaldehyde resin. At the present time, approximately fifteen mills make a direct addition to their UF resin processing bath of suitable odor-control products, designed for "wash-and-wear" fabrics.

Statistics have been provided, through the various textile journals, indicating that with the boom in "wash-and-wear", nearly 1.1 billion yards of cotton apparel fabrics were produced in 1957, two billion late in '58, and further growth has been apparent in 1959 and 1960. The control of the odor associated with "wash-and-wear" fabrics is of great importance. Obviously, the class of resin chosen for the treatment of such fabrics will influence the type of odor in the finished fabric. Usually, objectionable odors other than formaldehyde and amines are of low intensity and not considered offensive or unpleasant. However, we are sure you will agree that, when insufficient washing is done, all fabrics could stand a treatment to inhibit the development of malodors.

FORMALDEHYDE AND AMINE COMPOUNDS———The most objectionable odors are the amine, which leave a fishy residue, and are apparently formed in any class of formaldehyde resin by the reaction of the formaldehyde and amine compounds present. In addition, the use of alkyl amines in the synthesis of some resins can cause an unpleasant scent to develop later. Use of these resins can also generate sufficient formaldehyde into the plant atmosphere to constitute a disagreeable nuisance to plant personnel.

Original work toward the correction of odors associated with urea-formaldehyde resins and other types was begun a number of years ago both in this country and abroad. The major problem in developing the right material seemed to center around the selection of products which would result in neutrality rather than floral or perfumed types of odors. Many of the earlier products volatilized so rapidly that they were unable to give any lasting effect, and by the time the curing conditions were established most of the odor effects were lost or proved ineffectual in covering the disagreeable odors.

The new odor-control products (*16*) that have been designed are believed to neutralize the attending odors and are in turn neutralized by it, leaving the fabric in an essentially odorless condition. The application of these new-design products makes the plant atmosphere a great deal more pleasant and agreeable for plant personnel as well as contributing to the improved odor of the fabrics. Unlike formaldehyde acceptors, such as urea and dicyandiamides, the new

products effectively control the fabric odor without any effect on such fabric properties as shrinkage control, crease resistance, water-repellency, strength, color, washing appearance etc. The new products have absolutely no effect on the curing properties of the resin. Formaldehyde acceptors, while effective in controlling formaldehyde odors, often increase the possibility of the development of fishy amine odors, whereas the new products are completely free of this defect. It is possible to apply the new products directly in operations involving urea-formaldehyde, cyclic urea, etc, and their small cost is approximately .01 to .05 of a cent per yard.

Their application is very simple, and is particularly advantageous to plants that do not afterwash. The addition of four to eight ounces of the odor-control product per 100 gallons of resin finish bath will cover odor in the plant atmosphere and in the fabric itself (*15*). In plants which do afterwash, control of latent-odor development can be achieved with the use of one to four ounces of odor-control product per 100 gallons of final rinse water (*15*). Even in plants which apply an odor-control product in the last rinse of the afterwash, the practice of using an additional four ounces or so per 100 gallons of finishing bath is often followed to improve the general working atmosphere (*15*). The odor-control products are compatible with all ingredients of the resin-finish bath. We recommend that the user of odor-control products set up his own standards to guide him in his evaluation, since he is better acquainted with his operations. As only small amounts of the odor-control preparations are required, we suggest the avoidance of excess concentrations which are both wasteful and unnecessary.

AFTERTREATMENT ——— It is also well to note at this time that, on occasion, odors develop either directly after curing or after the fabric is aged, even if the fabrics were well processed. This presents a different odor problem from that encountered in actual processing, and therefore a special product (*17*) was developed to provide a simple means of rapidly treating such goods, so as to restore them to an odor-free condition for shipping. In this case, the goods are padded through a room-temperature bath containing 0.25% of the designed odor-control product, plus 0.1% soda ash in the solution. Fabric is then dried. This provides an aftertreatment of resinated fabrics, which might otherwise fail to reach the market (*15*) .

ODOROUS PLANT INTERIORS ———I am sure that all of us, encountering a closed area without the best ventilation, have experienced the irritating odors traceable to formaldehyde somewhere in the area. Consequently, there exists today a specially developed product (*18*), not designed for masking but to chemically control the irritating odor itself. This product can be employed either as a water spray or from an aerosol at a concentration of 1%, directly into the fume exhaust or into the atmosphere surrounding a troublesome area. Application should be made in the form of a fog spray, preferably directly into the fumes. If spray equipment is not available, such material can be vaporized, using steam, at 15-45 psi (*15*).

JOINT STUDY OF ODOR PROBLEMS———We realize that each mill's operation is at least somewhat different from the others, and therefore we recommend that, in dealing with the problems of odor, the mill consult reliable firms, and work together towards producing the best possible odor-control situation.

PLEASANT SCENTS———For a number of years some mills have employed aromatic chemicals, or so-called perfume compounds for imparting pleasant scents to fabrics. This has been particularly true in hosiery processing, lingerie and some narrow fabrics. The improvements in the manufacture of synthetic aromatic chemicals and the advent of new odor-control products can further tremendously the marketing value of certain classes of goods other than those already mentioned. The trend, however, seems to be towards obtaining a note of freshness in the fabrics and of giving a clean, laundered effect. This should be of interest for sheetings and towels, and, we believe, white goods in general.

PUBLIC OPINION OF MALODORS———Our report today has provided, we hope, some ideas which are new to you about the sense of smell:

a) that various odormetric measurements are important when designing odor-control products;
b) that whether such products are used for waste treatment or for product reodorization, they offer the most economical approach to an otherwise costly problem.

With this background at hand we would like to conclude our presentation with a few remarks about what the public itself feels about odor.

Recently an opinion research survey (*19*) brought out some rather unusual comments which we would like to report—not because they are characteristic of your industry, but because they indicate public thinking. This survey showed that the major adverse element of a large industry's reputation is the odor factor; that the strongest negative element is the unpleasant odors and dirt which people associate with the industry; that they believe towns where there are mills to be always smelly and dirty. It was also noted that, while the textile industry is trying very hard to improve its waste problems, and probably spends more than many other industries, there seems to be very little awareness of a company's efforts to alleviate this problem. It was reported that some 285 contacts out of 1800, who objected to the industry in their comunity, did so because of the odor. This public awareness of odor is further emphasized by the fact that of the 1800 people questioned, 16% definitely would not want a mill in the community because of the odor problem, 69% had no comment and 10% objected to odors from other industries. In the higher income groups questioned, 48% commented and 28% of these, or over half, objected to the possiblities of malodors.

This survey is but one of the indications of interest in the problem of air pollution. Public awareness of odor is shown by the remark of many of the persons surveyed that state governments should do more to make companies reduce stream and air pollution. We find that the national position has been brought to your attention by the recent symposia of the U S Public Health Service, which released figures showing that every day, regardless of environment, each human being takes into his lungs 15,000 quarts of air per day—ten times as much, by weight, as our intake of food and water combined.

CONCLUSION

In conclusion, I hope we have brought to you some knowledge of the use and selection of odor-control products. We realize that the odor effects desired and achieved are often subjective and qualitative impressions on the nose, and that olfactory reception and organoleptic analysis do not follow clear-cut rules. Nevertheless, you can have better-smell-

ing products and a pleasant working atmosphere if you wish. You can abate some malodors, and in many cases eliminate the offensive odors from your operation.

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(13) Credit, B-I-F Industries, Inc, early bulletins, industrial wastes.
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(15) Paul Jacobs, SAB Chemical Co, Jersey City, NJ.
(16) Alamask LYF-M-X, LYF-X-2, Rhodia Inc, NY.
(17) Alamask CNG-C, Rhodia Inc, NY.
(18) Formol 11-X, Rhodia Inc, NY.
(19) A recent appraisal of a large industry in the south.

"International Textile Technology—Key to Progress"———

EXECUTIVE COMMITTEE SELECTED FOR '61 CONVENTION

THE Executive Committee and the theme for the 1961 National Convention, which will be held Sept 27-29 at the Statler Hilton Hotel, Buffalo, NY, with the Niagara Frontier Section serving as host, have been selected.

The theme will be "International Textile Technology—Key to Progress".

The Executive Committee is as follows:

Chairman—William H Leyking, National Aniline Div

Vice Chairman—Nicholas J Mohoruk, Hamilton Cotton Co, Ltd

Dining—Zane S Messinger, National Aniline Div

Entertainment—Kenneth A Lister, Canadian Industries, Ltd

Exhibits — Frederic Sievenpiper, National Aniline Div

Finance — Salvatore J Puliafico, National Aniline Div

Hotel & Reservations—James F Best, National Aniline Div; William K McCusker, Stauffer-Dobbie Mfg Co

Ladies—Margaret R Hallinan, National Aniline Div; Grace C Frank, MacDonald Institute

Printing — Holger S Thuemmel, National Aniline Div

Publicity—Daniel E Boland, Western Electric Co; Edward P Carney, Canadian Aniline & Extract Co, Ltd

Reception—Carl H Ludders, National Aniline Div; Emmanuel I Birnbaum, Hart Products Co of Canada Ltd

Registration—Neil J Battistelli, National Aniline Div; John Wallace, Supersilk Hosiery Mills

Technical Programs—Thomas R Foltz Jr, Lockport Felt Co; James Rowatt, Harmont Color & Chemicals Co

Photo taken at most recent meeting of the Executive Committee for the 1961 National Convention shows Committee members, AATCC's president and executive secretary, and the chairman of the Niagara Frontier Section, host Section for this year's meeting.

Front row, l to r: James Rowatt, technical programs; Grace C Frank, ladies; George P Paine, executive secretary, AATCC; Elliott Morrill, president, AATCC; William H Leyking, 1961 Convention chairman; Margaret R Hallinan, ladies; and Nicholas J Mohoruk, 1961 Convention vice chairman.

Middle row, l to r: Salvatore J Puliafico, finance; Thomas R Foltz Jr, technical programs; John Wallace, registration; James F Best, hotel & reservations; Anton M Viditz-Ward, chairman, Niagara Frontier Section; and Edward P Carney, publicity.

Top row, l to r: William K McCusker, hotel & reservations; Emmanuel I Birnbaum, reception; Daniel E Boland, publicity; Holger S Thuemmel, printing; Carl H Ludders, reception; Frederic Sievenpiper, exhibits; and Kenneth A Lister, entertainment.

Activities of the Local Sections

Pacific Southwest

JOHN A LABEREE, manager of the Pacific District of the DuPont Company's extension division, served as guest speaker at the Pacific Southwest Section's January 27th meeting, held at the Rodger Young Auditorium, Los Angeles, Calif.

In his talk, entitled "The Menace of the Misinformed", Mr Laberee pointed out the dangers resulting from economic misinformation about many vital areas. High among these, he stated, are the basic role of big business in our economy, the danger of inflation—both to industry and the individual, confiscatory taxation, and the importance of productivity in the American system of free enterprise.

Angus H Roberts, chairman, Pacific Southwest Section, chats with guest speaker John A Laberee at January 27th meeting

John A Laberee, manager, Pacific District, DuPont Co Extension Division, guest speaker at PSW Section's January 27th meeting

Mid-West

THE Winter Meeting of the Mid-West Section was held at the Hotel Sherman, Chicago, Ill, February 4th.

Eighty-one members and guests were in attendance for the afternoon session, which featured as guest speaker Henry Millson, American Cyanamid Co, who spoke on "Microscopic Studies on Dyeing".

Elliott Morrill, AATCC's new president, and a long-time member of the Mid-West Section, was introduced at the afternoon session. Business conducted at the afternoon session included a reading and approval of the minutes of the last meeting, a report on the January Council meeting by Jack Kelley, a report by Robert Blank on arrangements for the Section's April 15th meeting at the Hotel Schroeder in Milwaukee, a report by Louis Haine on plans for the Annual Outing, a report by Glenn Templeton that the Technical Committee had decided to reschedule presentation of an Intersectional Contest paper until 1962, and an announcement by Section Chairman James McGowan that the National Council had accepted the Section's invitation to meet in Chicago Nov 16-18 in conjunction with the Section's November 18th meeting.

HEAD TABLE AT MID-WEST SECTION'S FEB 4 MEETING—Standing, l to r: E Morrill, AATCC president; F Stover, M-W vice chairman; J Williams, evening speaker. Seated, l to r: A J Andrews M-W secretary; H Millson, afternoon speaker; J Miller, M-W treasurer; J McGowan, M-W chairman

At the evening session, attended by 88 members and guests, John K Williams, assistant director of public relations, Electromotive Division, General Motors Corp, delivered a talk entitled, "I Spy for the USA".

Northern New England

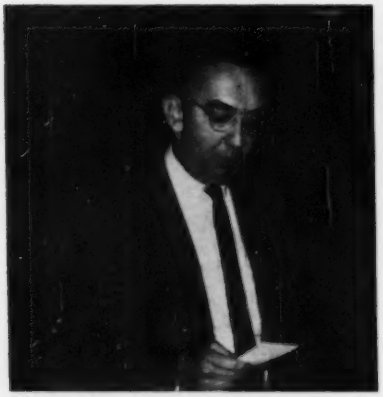
(Photos by L E Rossiter, Nopco Chemical Co)

TEXTILE FINISHING — modern and obsolete, practical and space oriented, was covered in depth by a panel of speakers, which led a spirited symposium on this subject at the Feb 3 meeting of the Northern New England Section held at Motel 128 in Dedham, Mass. The panel was composed of John J McDonald, professor of textile dyeing and finishing, Lowell Technological Institute; Werner von Bergen, associate director of research, J P Stevens and Co; and D Donald Gagliardi, president and research director, Gagliardi Research Corp.

The symposium was opened with a brief introductory talk by each of the speakers. D Donald Gagliardi, on the subject of "Chemical Finishing of Cellulosic Fabrics", discussed the use of reactive resins and polymers with natural fibers in woven and non-woven fabrics. These, he pointed out, can give new properties and characteristics which are not available in nature.

John J McDonald, discussing the "Mechanical Finishing of Textile

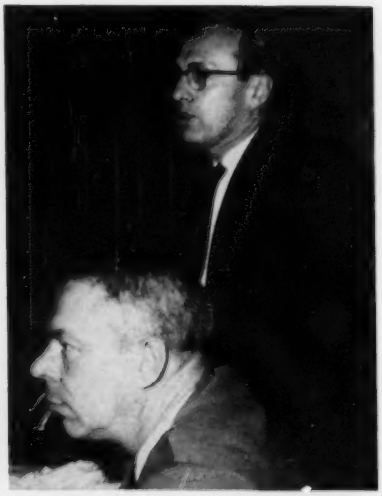
FORUM SPEAKERS GREETED BY NNE PROGRAM CHAIRMAN——L to r: Werner von Bergen, associate director of research, J P Stevens & Co; D Donald Gagliardi, president & research director, Gagliardi Research Corp; John J McDonald, professor of textile dyeing and finishing, Lowell Technological Institute; Frank J Rizzo, QM R & E Command, NNE Section program chairman.



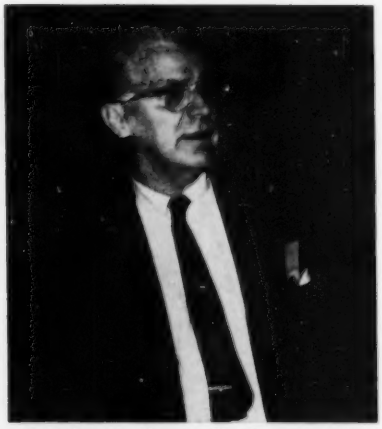
R C Wade, Metal Hydrides, Inc, directs question to forum speaker D D Gagliardi

Richard Does, General Latex Co (seated) ponders point proposed by Joseph Weldon, Goodyear Chemical Div, during forum discussion.

Edward J McNamara Jr, Hamilton Chemical Corp, chairman, NNE Section, presents plaque to Robert D Robinson, Industries Research, Inc, in honor of Mr Robinson's two years of service as chairman of the Section



A J Carbone, Sandoz, Inc (standing) questions speaker while Larry Sullivan, Farnsworth Mills (seated) considers answer



D H Powers, Warner-Lambert, questions Werner von Bergen

Andrew J McNulty, Waumbec Dyeing & Finishing Co, questions Professor McDonald

Fabrics", made the point that there is no important distinction between chemical and mechanical finishing, and both are of equal importance. He made a plea for greater automation to enable the mechanical phases of finishing to keep pace with the advances in the chemical developments. The critical aspects of drying were a further phase of Professor McDonald's talk.

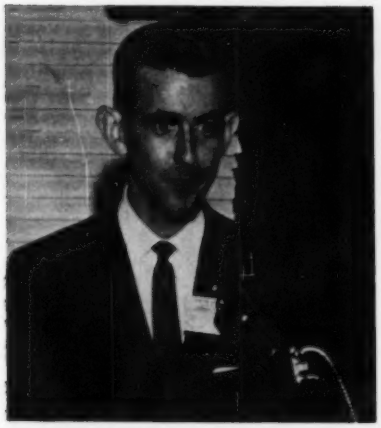
Werner von Bergen, in his introductory remarks on "Chemical Finishing of Wool and Wool Blended Fabrics", suggested that recent developments in wool finishing were stimulated by results being achieved in man-made fibers. As an illustration, he called attention to the interest shown in the wool-fiber fabrics field for such finishing processes as mothproofing, waterproofing, shrinkproofing, "wash-and-wear", "minimum-care" and oil repellency.

NNE Section's most recent past chairman, Robert D Robinson, Industries Research Inc, was presented a plaque by the Section in honor of his two years of service to Section.

The next meeting of the Northern New England Section is to held on March 24 at the Colonial Country Club, Lynnfield, Mass.

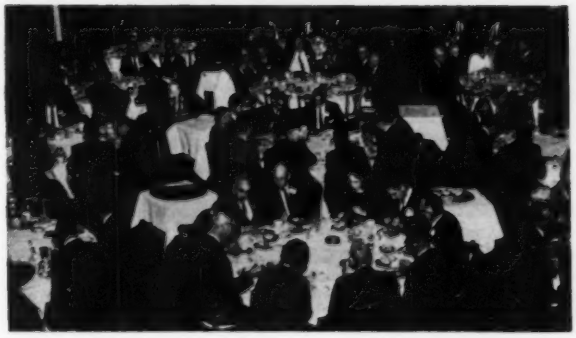
Joint Meeting—Piedmont and Palmetto Sections

January 20-21, 1961
Poinsett Hotel, Greenville, SC



R Lee Wayland, Dan River Mills Inc, presenting the Piedmont Section's 1960 Intersectional Contest first-prize-winning paper

PALMETTO SECTION OFFICERS—1961———Seated, l to r: John Bell Jr, Bishopville Finishing Plant, sectional committeeman; Gertrude Lathrop, Old Fort Finishing Plant, chairman, Research Committee; Lewis T Kelly, Lyman Printing & Finishing Co, National Councilor. Standing, l to r: E Thomas McIlwain, Ansbacher Siegel Corp, secretary; Roscoe J Breazeale, Warwick Chemical Co, sectional committeeman; William F Thompson, Clearwater Finishing Co, sectional committeeman; Neal A Truslow, U S Rubber Co, vice chairman; Richard E Rettew, Polymer Southern, chairman; Linton C Reynolds, Riegel Textile Corp, National Councilor. Not shown in photo: William E Baldwin, Fairforest Finishing Plant, treasurer; George Cocoros, Deering Milliken Research Corp, sectional committeeman; Joseph C King, Metro-Atlantic Corp, National Councilor.



Rhode Island

RHODE ISLAND SECTION held its January 27th meeting at Lindy's Bali Room, Cranston, RI, with about seventy-five people in attendance.

Joseph Andever, American Viscose Corp, presented a paper entitled "Modified Fibers in Blends with Synthetic and Natural Fibers".

The Section's next meeting will be held March 24.

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Clarence A Seibert, Scholler Bros, chairman, Delaware Valley Section

Edward G Haack, General Dyestuff Co, vice chairman, Delaware Valley Section

Delaware Valley

DELAWARE VALLEY SECTION held a dinner meeting on Friday, January 13, at Kugler's Restaurant, Philadelphia, Pa, with 110 members and guests in attendance. George M Gantz, General Aniline & Film Corp, guest speaker on this occasion, spoke on "The Lightfastness of Optical Brighteners.

Dr Gantz, in his talk, explained that several commercially available stilbene-triazine-type brighteners had been applied to cotton fabric and subjected to a variety of outdoor and accelerated laboratory lightfastness tests. Changes in fluorescence and whiteness were measured with a fluorescence photometer and a Hunterlab Reflectometer for whiteness.

He pointed out that exposure outdoors for one day by either the daylight or sunlight method resulted in a loss of fluorescence of approximately 25%. A similar loss in fluorescence occurred in two hours in a carbon-arc Fade-Ometer. Xenon arc or sunlamp exposures were less severe than the carbon-arc exposure. It was concluded that optical brighteners are sensitive to ultraviolet light and that the carbon arc Fade-Ometer is a particularly severe accelerated testing device.

DELAWARE VALLEY SECTION OFFICERS, 1961—L to r, seated: James E Conway, American Cyanamid Co, National Councilor; Edward G Haack, General Dyestuff Co, vice chairman; Clarence A Seibert, Scholler Bros, Inc, chairman. L to r, standing: Frank A Mather, Para-Chem, Inc; Joseph J Murphy, Laurel Soap Mfg Co; Frederick V Traut, Globe Dye Works Co; Walter W Gleadall, Textile Chemical Co, sectional committeemen. Officers absent when photo was taken: Charles N Kuzma Jr, Amalgamated Chemical Corp, treasurer; Ernst W Empting, Verona Dyestuffs, secretary; and L Kevin McChesney, Leatex Chemical Co, William H Bertolet III, Laurel Soap Mfg Co, Inc, John H Davids, Quaker Chemical Products Corp, and Virgil D Lyon, E I duPont de Nemours & Co, Inc, National Councilors.

SECTIONAL COMMITTEEMEN, DELAWARE VALLEY SECTION—L to r: Frank A Mather, Para-Chem, Inc; Joseph J Murphy, Laurel Soap Mfg Co; Frederick V Traut, Globe Dye Works Co; and Walter W Gleadall, Textile Chemical Co

L to r: Clarence A Seibert, Scholler Bros, Inc, chairman, DV Section; Edward G Haack, General Dyestuff Co, vice chairman, DV Section; William S Sollenberger, American Viscose Corp, AATCC vice president, Central Atlantic Region; George M Gantz, General Aniline & Film Corp, speaker at Jan 13th meeting

Washington

LOUIS R MIZELL, chairman, Washington Section, has announced the following committee chairmen for 1961:

Program—Esther L Batchelder, U S Dept of Agriculture

Arrangements — Josephine M Blandford, National Bureau of Standards

Individual Membership—A Eleanor Davis, Harris Research Laboratories

Corporate Membership—Ralph L Carr, Olin Mathieson Chemical Co

Publicity—Julian Berch, Harris Research Laboratories

Intersectional Contest—Ethyl C McNeil, U S Dept of Agriculture

Hospitality—Edward C Oliva, Harris Research Laboratories

Audit—Charles G Tewksbury and Edward C Oliva, Harris Research Laboratories.

The next meeting of the Washington Section will be held in the Embassy Room of the Broadmoor Restaurant, Washington, DC, on March 17. Speaker will be Edmund M Buras Jr, Harris Research Laboratories, who will discuss "Soviet Artificial and Synthetic Fibers". A social hour will precede the meeting.

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Metropolitan

METROPOLITAN Section will hold its next meeting at Kohler's Swiss Chalet, Rochelle Park, NJ, on Friday, March 24, at which time Arthur N Adlman, senior associate, Werner Textile Consultants, will speak on "The Market Opportunities of the Metropolitan Section of AATCC".

CERTIFICATES OF SERVICE AWARDED

Three of the twelve recipients of Service Certificates———I to r: Robert P S Black, Elliott Morrill and Emil G Wiest

PRESIDENT Elliott Morrill has presented Certificate of Service Awards, in recognition of leadership and in appreciation of technical and scientific contributions to AATCC research and to the textile industry, to eleven recipients—ten past chairmen of AATCC research committees and one former member of the Executive Committee on Research. In turn, Charles A Sylvester, chairman of the Executive Committee on Research, presented a Certificate of Service award to Mr Morrill for his past services as a member of ECR.

The other eleven recipients are as follows:

Robert P S Black, E I duPont de Nemours & Co, Inc, past chairman, Committee on Bleaching

Alfred T Clifford, Riegel Textile Corp, past chairman, Committee on Nuclear Radiation

Roland E Derby Jr, The Derby Co, Inc, past chairman· Committee on Color

Herman B Goldstein, Warwick Chemical Co Div, past chairman, Committee on Evaluation of Finishes for Resistance to Staining and Soiling

Charles W Saalfrank, Sandoz, Inc, past chairman, Committee on Colorfastness to Pleating

Joseph W Schappel, American Viscose Corp, past chairman, Committee on Soiling of Carpets

James M Straley, Tennessee Eastman Corp, past chairman, Committee on Colorfastness of Textiles to Atmospheric Contaminants

John T Taylor, Rohm & Haas Co, past chairman, Committee on Nonwoven Fabrics

Emil G Wiest, E I duPont de Nemours & Co, Inc, past chairman, Committee on Analytical Methods

Ruby K Worner, Southern Research Laboratory, USDA, past chairman, Committee on Water Resistance of Fabrics

Stephen J Kennedy, Quartermaster Research and Development Center, former member, Executive Committee on Research.

AATCC Calendar

COUNCIL
Apr 21 (Durham, NC); Sept 26 (Buffalo, NY); Nov 17 (Chicago, Ill); Jan 26 (New York, NY)

NATIONAL CONVENTIONS
Sept 27-29, 1961 (Hotel Statler, Buffalo, NY); 1962 (Atlanta Biltmore Hotel, Atlanta, Ga); 1963—Boston; 1964—New York; 1965 (Conrad Hilton Hotel, Chicago, Ill)

DELAWARE VALLEY SECTION
Apr 14 (Ladies Night—Cherry Hill Inn, Haddonfield, NJ); May 19 (Outing—North Hills CC, North Hills, Pa); Sept 15 (Wilmington, Del); Oct 27 (Beck's); Dec 1 (Beck's)

HUDSON-MOHAWK SECTION
Mar 10 (Johnstown, NY—paper on "Wash-and-Wear" Fabrics); Apr 14 (Waterford, NY—plant tour of General Electric Co's Silicone Div); May 12 (Ladies Night); June 23 (Outing—Antlers Club, Amsterdam, NY)

METROPOLITAN SECTION
Mar 24 (Kohler's Swiss Chalet, Rochelle Park, NJ—"Market Opportunities for Color"—Arthur N Adlman, Werner Textile Consultants); April 21 (Kohler's Swiss Chalet, Rochelle Park, NJ—"Importance of Bow and Skew"—Lucille Rea, Simplicity Patterns, and John Robertson, Mt Hope Machine Co); May 19—(Kohler's Swiss Chalet, Rochelle Park, NJ—Ladies Night).

MID-WEST SECTION
April 15 (Schroeder Hotel, Milwaukee, Wis); June 24 (Annual Outing—Ceramí's Island View Resort, Burlington, Wis); Nov 18 (Chicago, Ill)

NIAGARA FRONTIER SECTION
Apr 7 (Joint meeting with Ontario Section, CATCC, St Catherines, Ont); May 18 (Buffalo, NY)

NORTHERN NEW ENGLAND SECTION
Mar 24 (Colonial Country Club, Lynnfield, Mass); May 5-6 (New England Regional Meeting, Jug End Barn, S Egremont, Mass); Sept 8 (Annual Outing); Oct 20 (Quartermaster R & E Command, Natick, Mass); Dec 18 (Motel 128, Dedham, Mass); Jan 19 (Woodlawn Country Club, Newton, Mass)

PALMETTO SECTION
Apr 15-16 (Richmond Hotel, Augusta, Ga); June 8-10 (joint outing with Piedmont Section at Grove Park Inn, Asheville, NC); Sept 15-16 (Clemson House, Clemson, SC); Jan 20-21 (Poinsett Hotel, Greenville, SC); April 14-15, 1962 (Francis Marion Hotel, Charleston, SC)

PIEDMONT SECTION
April 22 (Washington Duke Hotel, Durham, NC); June 9-10, 1961 (Outing—Grove Park Inn, Asheville, NC); Sept 23, 1961 (Hotel Charlotte, Charlotte, NC)

RHODE ISLAND SECTION
Mar 24 (Dinner Meeting); May 5-6 (New England Regional Meeting, Jug End Barn, South Egremont, Mass); June 23 (Outing); Sept 15 (Management Meeting); Oct 27 (Dinner Meeting); Dec 1 (Annual Business Meeting)

SOUTH CENTRAL SECTION
Apr 15 (Hotel Patten); June 16-17 (Summer Outing—Riverside Hotel); Sept (Hotel Patten—tentative)

SOUTHEASTERN SECTION
Apr 8 (Atlanta Athletic Club, Atlanta, Ga); June 9-10 (Summer Outing, Radium Springs, Albany, Ga); Sept 9 (Ida Cason Gardens, Pine Mountain, Ga); Dec 2 (Atlanta Athletic Club, Atlanta, Ga)

WESTERN NEW ENGLAND
Mar 17 (Shelton, Conn); May 5-6 (New England Regional Meeting, Jug End Barn, S Egremont, Mass); May 19 (Ladies Night—Rapp's Paradise Inn); June 9 (Annual Outing); Sept 15 (Plant visitation); Oct 27 (Annual Meeting); Dec 1 (Shelton, Conn)

Membership Applications

January 26 - February 15, 1961

NEW ENGLAND REGION

Northern New England Section

Associate

Jesse Jackson—Textile dyer, Wyandotte Worsted Co, Rochester, NH.

Rhode Island Section

Senior

Stephen J Bercen—President & treas, Bercen Chemical Co Inc, Providence, RI. Sponsors: G D Jackson Jr, R D Easdon.

Junior

Edward W Roda—Management trainee, Warwick Chemical Co, Wood River Jct, RI. Sponsors: H C Whittemore Jr, H B Goldstein.

Transfer to Senior

William A Capuano—Asst supt of finishing, Cranston Print Works Co, Cranston, RI. Sponsors: H F Kilguss, E Owren.

Transfer to Associate

Richard Ormerod — Teacher, Bourne High School, Bourne, Mass.

CENTRAL ATLANTIC REGION

Metropolitan Section

Senior

Theodore D Betsch—Tech sales service rep, Chemstrand Corp, New York, NY. Sponsors: R P Nirenberg, T L Rusk, Jr.

Rico P Coladarci—Dyer, Associated Dye & Print Co Inc, Paterson, NJ. Sponsors: A J Ramunda, J S Birch.

Jacques E Wegmann—Application research chemist, Toms River Chem Corp, Toms River, NJ. Sponsors: T P Higgins, O Grosz.

Associate

Kyo Ohta—Rep, Kureha Spinning Co, Ltd, New York, NY.

Junior

J Carey Hutchinson Jr—Salesman, dyestuffs & chemicals, National Aniline Div, Allied Chem Corp, New York, NY. Sponsors: P J Sullivan, J D Noonan.

SOUTHERN REGION

Northern Piedmont Section

Senior

Joseph P Gaino—Asst plant supt, Dublin Finishing Co, Div of Burlington Ind, Dublin, Va. Sponsors: J Greer, J T James.

James L Royal—Lab supv colorist, Chatham Mfg Co, Elkin, NC. Sponsors: W G Green, C C Cayce.

Charles E Umberger—Production dyer, Burlington Industries Inc, Greensboro Finishing Co, Greensboro, NC. Sponsors: G R Turner, J E Greer.

Transfer to Associate

John Apinis—Lab technician, Burlington Industries, Wake Finishing Co, Raleigh, NC.

Palmetto Section

Senior

Robert C Leslie—Asst overseer, package dye house, Abbeville Mills Corp, Abbeville, SC. Sponsors: J B Porter, E T Mobley.

Associate

Lionel E Jones—Chemist, Lyman Printing & Finishing Co Inc, Res & Dev, Lyman, SC.

Junior

Arnold R Atkinson—Shift dyer, Hatch Mill, Columbus, NC. Sponsors: B G Barnhill, K A Jenkins.

South Central Section

Senior

Harvey E DeLay—Supt, Standard-Coosa-Thatcher Co, Rossville, Ga. Sponsors: J D Mosheim, L Shive.

Southeastern Section

Senior

Robert E Bailey—Overseer of dyeing, Callaway Mills Co, Hillside plant, LaGrange, Ga. Sponsors: A K Haynes, C E Coleman.

Ruth R Benerito—Head, colliodal chemistry investigations, Southern Regional Res Lab, Cotton Chemical Lab, New Orleans, La. Sponsors: L W Mazzeno Jr, W A Reeves.

Herman P Bruckner — Junior chemist at Interchemical Corp, Color & Dyestuff Div, Hawthorne NJ. (Presently in service, drafted in May, 1960). Sponsors: T Rusticus, R A Duchacek.

Stanley R Hobart—Chemist (organic), Southern Utilization Res & Dev Div, U S Dept of Agriculture, New Orleans, La. Sponsors: J D Guthrie, G L Drake Jr.

Hubert H James—Chemist, Jefferson Mills, Inc, Jefferson, Ga. Sponsors: W B Amos, R B Van Tassel.

James J O'Donnell—Industrial & agricultural sales, U S Borax, Atlanta, Ga. Sponsors: W F Crowell Jr, R M Jones.

Hilda M Ziißle—Associate physicist, Southern Regional Research Lab, New Orleans, La. Sponsors: L W Mazzeno Jr, W A Reeves.

Associate

Donald W Urban—Technical rep, Union Carbide Chemicals Co, Atlanta, Ga.

WESTERN REGION

Mid-West Section

Transfer to Senior

Jack B Colquitt—Sales rep, Koppers Co Inc, Chemicals & Dyestuffs Div, Chicago, Ill. Sponsors: E Morrill, J E Miller.

Junior

Daniel J Barufaldi—Dyestuff salesman, Ciba Co Inc, Skokie, Ill. Sponsors: B Fay, W Boyd Jr.

Student

Martha M Field—Instructor, graduate student, Home Economics Dept, Indiana State Teachers College, Terre Haute, Ind. Sponsors: Rose Padgett.

Pacific Northwest Section

Associate

Robert L Queirolo—Asst regional sales mgr, chemist, Stauffer Chemical Co, North Portland, Ore.

Pacific Southwest Section

Senior

Thomas F McCarthy — Chemist, National Dyeing & Finishing Corp, Culver City, Calif. Sponsors: D D Sanders, L Lasas.

STUDENT CHAPTERS

New Bedford Institute of Technology

Student

Kaushik K Shah—Student, New Bedford Institute of Technology, New Bedford, Mass. Sponsor: F Tripp.

North Carolina State College

Student

Naranbhai M Patel—Student, North Carolina State College, Raleigh, NC. Sponsors: H A Rutherford.

NOT AFFILIATED WITH A SECTION

Senior

Melahat E Basoglu—Mgr dyestuff purchasing dept, Sumerbank, Turkish State Textile & Paper Mills, Istanbul, Turkey. Sponsors: G E Neisser, L Fusser.

Adrianus C Bogers—Chief laboratory, "De Regenboog", Janssen & Bierens, N V, Tilbur, Holland. Sponsors: G J Mandikos, G M Kidder.

Gross A Janutolo—Technical sales agent for Biella zone, Dott Aldo Garzanti Sas (E I duPont de Nemours & Co), Milan, Italy. Sponsors: G Briganti, A Zambianchi.

Transfer to Senior

Manuel C Lourdes—Chief dyer, Tenidos Y Acabados De Lama, S A, Tepepam, Mexico. Sponsors: S L Sampson, P Belmont.

Elected to Membership

No designation after name indicates Senior
(A) indicates Associate
(J) indicate Junior
(S) indicates Student
* indicates transfer from another class of membership

January 26, 1961

NEW ENGLAND REGION

Rhode Island Section

John W May (J)

CENTRAL ATLANTIC REGION

Delaware Valley Section

Daniel B Campbell (A)

Metropolitan Section

Albert J Young (A)

SOUTHERN REGION

Piedmont Section

Gerard M Currier (S)
*Benjamin H Bell**
*Edward A Dalmas**
*James B Johnson**
*Chung Sun Suh**

Southeastern Section

James N Foster
Rita Maria Perkins
Patrick N Baker (A)
*Virgil DeWayne McHone**

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Philadelphia College of Textiles and Science

Henrietta L Goethe (S)
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Mohamed E S El Ghoroury

February 9, 1961

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Donald J Walsh (A)
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TECHNICAL MANUAL IN ERROR ON DRYCLEANING TEST

THE 1960 *Technical Manual*, Vol 36, contains an error on page 88 in Test #85-1960, Colorfastness to Drycleaning, which seriously affects the performance of the test.

The amount of perchlorethylene required for the proper conduct of the test is 200 ml, not 100 ml as shown. The correct amount was given in the original publication of this test in the April 12, 1960 issue of *American Dyestuff Reporter*.

Also, in Paragraph 2 under Notes, reference to Tentative Test Method #85-1957 should be corrected to show reference to the new drycleaning test adapted in 1960 which has replaced it.

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks may be obtained from, and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

61-3
Education: PhD in Physical Chemistry, Osmania University, India; M Sc in Physical Chemistry; M S in Textile Chemistry & Dyeing; Senior Member, ACS and AATCC.
Position desired: Research director
Location: East coast, mid-west or abroad.
Age: 40; single; reference (excellent).
2-20, 3-6

Future Papers

THESE papers have been submitted for publication in future issues of the *Proceedings:*

"Science and Craft in Color"—Panel

"Modern Continuous Dyeing Processes"—Richard Kern, Sandoz Ltd

"A Study in Union Dyeing"—Northern New England Section

"Selection of Direct Dyestuffs for Application to Undesulfured Rayon Staple"—Southeastern Section

"Dyeing with Vinyl-Sulfone Reactive Dyes"—H Luttringhaus, Carbic-Hoechst Corp

"Status of Nonwoven Fabrics in the Textile Trade"—Howard W Shearer, American Viscose Corp

"New Fibers from DuPont"—Milton M Christie, E I du Pont de Nemours & Co, Inc

"Recent Developments in the Dyeing of Verel Modacrylic Fiber"—R J Fortune, Tennessee Eastman Co

"New Color-Measuring Instruments for Use by the Textile Industry"—F J Rizzo and A O Ramsley, Quartermaster Research and Engineering Command, U S Army

"The Applicaton Principles of Acrylic Backcoating"—Charles E Hoey, Rohm and Haas Co

"Dyeing Zefran Acrylic Fiber in Blends"—F M Rawicz, Dow Chemical Co

"American Standard Performance Requirements for Textile Fabrics"—Ephraim Freedman, Macy's Bureau of Standards

"Shade Control for Military Textiles Used by the U S Army Quartermaster Corps"—F J Rizzo, QM R & E Command

"The Effect of Weft Yarn Twist upon the Properties of Cotton Fabrics Before and After Resin Treatment"—Edna Meshke, Univ of California

NOMINATIONS FOR THE HAROLD C CHAPIN AWARD

THIS award is presented annually at the Association's Annual Convention to a Senior Member of at least twenty years continuous membership in AATCC who has contributed outstanding service in enabling the Association to attain the objects for which it was founded. The award is in the form of a suitably worded, framed, illustrated scroll.

Established in 1958, the first recipient was Harold C Chapin, for whom the service award was named, who served as secretary of AATCC during a quarter of century. Dr Chapin was cited for his example that inspired the creation of the award, for his outstanding leadership, for dignity and integrity in office, for indefatigable attention to minor detail and major policy, for advancing the Association's objectives, for bringing national and international prestige to the Association, and for long and devoted service.

The selection of the recipient is by the unanimous choice of a committee consisting of one member from each of the four Regions, appointed for four years by the Councilors of the respective Regions, the president of the Association ex-officio, and the executive secretary as secretary of the committee without vote. The committee rotates annually with the occurrence of one vacancy to be filled, the chairmanship being assumed by the committee member serving his fourth year. No committee member may be reelected for at least one year following completion of his term.

Senior Members of AATCC are invited to furnish full and detailed information of candidates nominated for this award, such as service on AATCC Research and Council Committees, accomplishments and contributions in enabling the Association to attain the objects for which it was founded. Organized campaigns promoting the candidacy of any individual will not be recognized by the committee. Consideration will be given only on factual evidence of the nominee's qualifications.

Nominations may be addressed to the Harold C Chapin Award Committee, c/o the executive secretary, AATCC National Headquarters, Box 28, Lowell, Massachusetts, and should be received prior to April first.

COLOUR INDEX HUE INDICATION CHARTS AVAILABLE FROM NATIONAL HEADQUARTERS

Copies of the *Colour Index* Hue Indication Chart are now available from National Headquarters at a price of $1.50 per copy.

This Chart enables a reader to translate into visual terms the verbal descriptions of hue given in the *Colour Index.*

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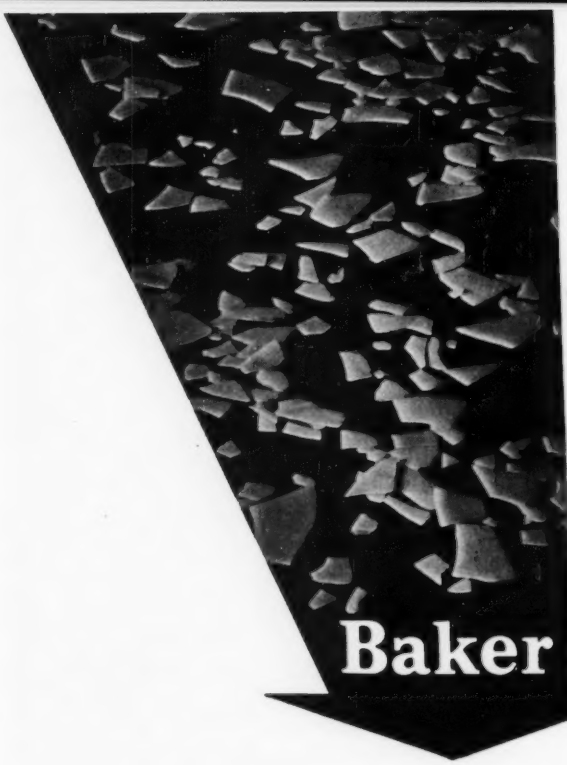

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Note that the flakes (reproduced actual size above) are *thin*. This means they go into solution *fast*—you save time and money, and solution is complete, so you do not have to filter—another saving. This chemical in thin flake form represents another Baker *first*.

You will also find that Baker Zinc Nitrate, Technical, is uniform – both chemically and physically – lot after lot. This is important for catalytic use, and it aids you in obtaining a uniform product.

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Write for samples and prices for this new *flaked* product, Baker Zinc Nitrate, Technical.

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Thin (0.035 in.) flakes about ½ inch in size with the following typical mesh analysis:

On U.S. No. 4	26%
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Consumer Complaints———

(*continued from page 28*)

complaint is a sugar-protein reaction which occurs on wool and silk fabrics when a liquid containing reducing sugars common in soft drinks comes in contact with the fabric. Though often invisible at first it will become a tan color or "caramelized" in pressing or in long storage under warm conditions. . .

"The stain category applies only to visible stains or discoloration of the textile not involving damage to the fabric. Many materials which come in contact with the fabric as 'stains' cause actual damage to the fiber, color or finish. As such problems are listed in separate categories, the total number of 'stain' type problems is considerably larger than shown". (3).

It should be stressed that these findings are in large measure influenced by the type of garments received by the National Institute of Drycleaning. Poor laundering, with emphasis on the use of too much chlorine bleach, and the use of overheated irons in ironing appear to be the major causes of failure of washables. However, these are hardly reflected in the Institute's data.

FABRIC DAMAGES———Second in importance as a textile failure caused by the consumer are holes, cuts, and tears that may be categorized as "fabric damages." Of the 8,888 consumer-caused failures, 2,758, or 31.0%, were fabric damages. Chemical damages accounted for over one-half (1,444) of these 2,758 damages. Another fifth (580) resulted from excessive heat. Sulfuric and chloride chemicals accounted for almost a half (619) of the 1,444 chemical damages.

DAMAGE TO DYES———Third in importance among failures caused by consumers is damage to dyes. This constituted 1976, or 22.2%, of the 8,888 consumer-caused failures. Since 1,373, or 69.5%, of the 1,976 dye damages were traceable to color loss from chemicals in cold wave solutions, another single cause of numerous textile failures is uncovered.

The 4,168 textile failures caused by drycleaners constitute the second category of failures making up unjustifiable complaints. Damaged fabrics, consisting of snags, cuts, holes, and the like (which may or may not have been made by the drycleaner) and stains resulting primarily from processing carelessness of drycleaners account for over one-half (2,233) af the failures for which drycleaners are responsible.

This analysis of the causes of textile failures suggests that a large proportion of the failures may be traceable to relatively few factors. The disproportionate share of failures accounted for by color failures has been noted. Silk splits, tendered curtains, and garments ruined by stains from caramelized sugar or damaged by chemicals from cold wave solutions are all illustrative of textile failures around which there are clusters of cases.

There is yet another type of concentration which should be noted. A few items appear to account for a relatively large number of textile complaints. Women's dresses alone, it appears, account for approximately one-third of returned merchandise studied in the department store laboratories. Labarthe's study (2) of customer complaints received at Kaufmann's over a period of years reveals, as set forth in Table II, that 42.6% of the garments received by that laboratory were women's dresses.

An analysis of complaints concerning dresses received by Gimbel's suggests that both customer-caused and merchandise-caused failures concerning dresses follow the same pattern as that for merchandise in general. Finally, it appears that the percentage of complaints concerning "budget," medium-priced, and expensive dresses ruled to be justifiable is approximately the same.

TABLE II

Customer complaints by types of garments submitted to the Kaufmann Fellowship at Mellon Institute, 1939-1953

Item	*Total*	*Percent of total*
Dresses	2632	42.63
Blouses	1438	23.29
Sweaters	349	5.65
Pajamas, robes, gowns	310	5.02
Coats	308	4.98
Slips	305	4.94
Bathing suits	239	3.87
Suits	168	2.72
Skirts	155	2.51
Raincoats	108	1.74
Jackets and suit coats	86	1.39
Play Clothes	76	1.23
Total	6174	100.00

CONCLUSION

Although the findings of this analysis of consumer complaints concerning textiles suggest that a continuing program of corrective action is needed, they suggest an even greater need for a continuing coordinated program of obtaining data from laboratories. Furthermore, implicit in the findings themselves are clues concerning the problems that must be solved to make an interlaboratory reporting program workable.

The importance of making use of the extensive data of the National Institute of Drycleaning is readily apparent. In addition, the laboratories of department stores instead of those of mail-order retailers, manufacturers, and universities, should be relied upon for data that might more readily represent a random sample of textiles. Since department-store laboratories are typically operated without fanfare, the searching out of these facilities is called for. The National Retail Merchants Assocation, directories of testing laboratories, local trade groups, and chambers of commerce are sources from which information might be obtained concerning the existence of department stores with laboratories.

Once these are identified, the cooperation of top executives must be obtained. This is essential because the reporting must necessarily be voluntary; the cooperation of buyers (as department managers) must be obtained; finally, complaint data, to be significant, should be related to sales data.

The great importance of a few specific items of returned merchandise suggests that the impact of these on the laboratory reports of complaints should be controlled. Essentially, a random sample of the major items of returned merchandise should be selected for examination in the laboratory. A beginning could be made with women's dresses. For each department store, total sales data on this item would be gathered. Data on total customer complaints about the performance of these items would likewise be studied. In accordance with a prearranged system, every nth dress returned because of unsatisfactory service would be tagged for submission to the laboratory. The test findings of the various laboratories reporting upon this

item could then be summarized, giving proper weight to the importance of each laboratory. This would represent the first step in the construction of an index based upon a stratified random sample designed to measure textile performance in general. A study of all textile complaints received by department store laboratories along with the extensive data of the National Institute of Drycleaning would, of course, continue to be made.

To reduce bias, general agreement must be established on the justifiability of certain types of complaints, at least for interlaboratory reporting purposes. Possibly short cases, similar to some of those alluded to in this report concerning the types of failure whose justifiability is questionable, could be distributed to a number of textile experts. Their majority "vote" on the justifiability of these complaints would serve as a basis for developing a reference for the guidance of reporting laboratories.

These suggestions seem to follow logically from the analysis of consumer textile complaints presented in this report. Differences with these proposals should not, however, obscure the essential findings. These may be summarized as follows.

Consumer complaints appear to have predictive value concerning the changing competitive position of different types of textiles. An impact on producers appears to follow complaints even though the failure complained about was caused by the consumer, not the textile. Laboratories differ in philosophy, in their policies concerning the handling of specific types of complaints, and in their views concerning the expected serviceability of specific items. Nevertheless, there is remarkable consistency in their findings in general.

They agree that the consumer is more often at fault in causing textile failures than the textiles themselves. Moreover, stains (the chief of which appears to be caramelized sugar) are the chief cause of consumer-induced failures. Fabric damages are second in importance. The leading cause of textile failures among those for which producers are responsible is color failure. Just as there is concentration on the conditions making for textile failure, there is a marked concentration on items. Dresses, for example, appear to be one item that accounts for a disproportionately large number of failures. Finally, these findings appear to support the view that there is a need for the implementation of a consciously conceived program of coordination among testing laboratories.

LITERATURE CITED

(1) Labarthe, Jules, "Ten Thousand and One Consumer Complaints," *Textile Research J 24*, No. 4, 328-42 (April, 1954).
(2) *Ibid*, pg 337.
(3) Johnson, Albert E, "First Progress Report and New AATCC Consumer Complaint Data System", *Daily News Record* (October 8, 1959).

ADR ABSTRACTS

Synthetic Fiber Nonwovens

Fox, K R, *Can Textile J* 77, 63, Dec 23, 1960

Synthetic fiber nonwovens are not yet in a position to present a major challenge to traditional textile markets, according to the author.

Successful textile materials represent a satisfactory combination of properties which produce good performance at a price attractive to the consumer. Fortunately, in conventional textiles there is room for compromise in properties within the confines of acceptability.

With the current state of the art this is not true with nonwovens. Adequate strength usually means poor absorbency and a "papery" hand. Adequate softness or drape is accompanied by poor durability and general structural weaknesses. The very binders which are used to impart integrity to webs at the same time create other properties which are undesirable.

The author outlines four areas in which he says intelligent research on nonwovens can broaden current markets and create new ones:

1) Fundamental studies of the engineering properties of the nonwovens. The technology developed over the last 20 years in the engineering of textile structures has made possible major improvements. Such a technology is lacking for nonwovens.

2) Applied research and product development. With specific market targets there is a great deal that can be done to improve present nonwovens. Studies of fiber surface morphology, binder technology, blending, and finishing methods are needed.

3) Production technology. Turning out textile-like nonwovens at the speed of paper-making equipment has created considerable interest, but the author warns that this greater production efficiency must be accompanied by improved product characteristics.

4) Fiber development. The biggest single boom for the field of nonwovens would be, in the author's opinion, the development of a low-cost man-made fiber with simulated felting properties. The felting properties of wool, in the price range of cotton, could put nonwovens in a position to compete quality-wise and price-wise with a good many conventional textile materials. No such fiber is known at present. If and when one is developed it should help to make nonwovens a major industry, the author says.

•

Clean, Boiled (Wool) Hospital Blankets

Pressley, T A, *J Textile Inst* 51, T1214-23, Dec, 1960

Cross-infection with antibiotic-resistant, "hospital" strains of *Staphylococcus aureus* has become a world-wide problem. Whether infection is more frequently acquired in the operating theater or in the ward is still an open question, but a body of opinion considers that dust-borne bacteria in the ward are a serious cause.

Among the sources of these bacteria in hospital wards, attention has recently been concentrated on wool blankets, which have been suspect because in the past they have seldom been washed.

If wool blankets are to remain in hospitals, simple sterilizing procedures must be available. These may be dry processes, using gases such as formaldehyde or ethylene oxide, or wet methods carried out during laundering.

The chief practical problem in the high-temperature laundering of wool blankets in untreated soft water is discoloration due to absorption of iron. Even 0.5 ppm of iron in the water rapidly gives rise to an unacceptable color. Published methods for high-temperature laundering do not prevent this color deterioration and so are applicable only where iron-free water, eg, from a base-exchange softener, is used. The degree of discoloration depends not only on the iron content of the water but also on the method used for making the blankets shrink-resistant.

(*continued on page 65*)

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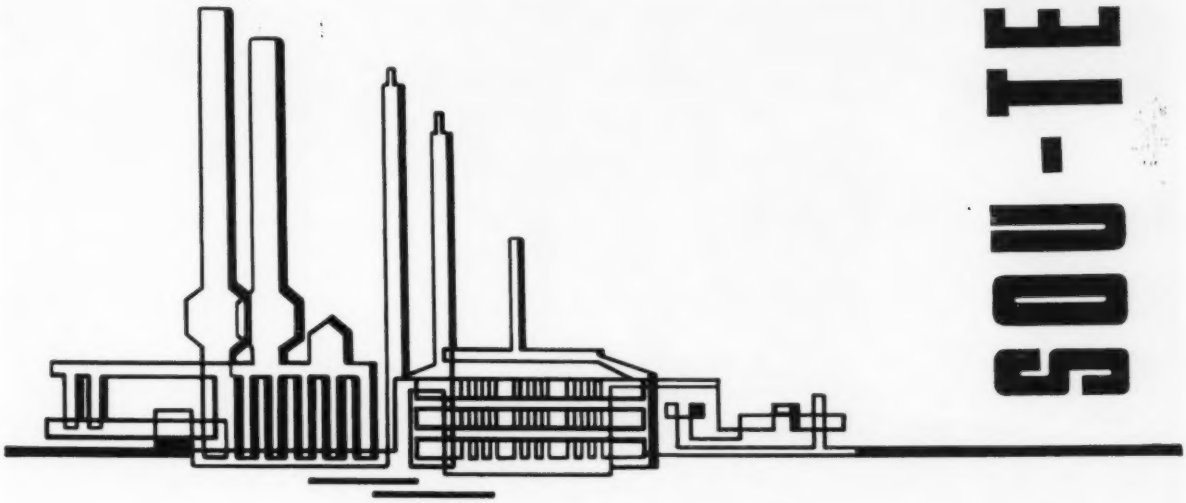

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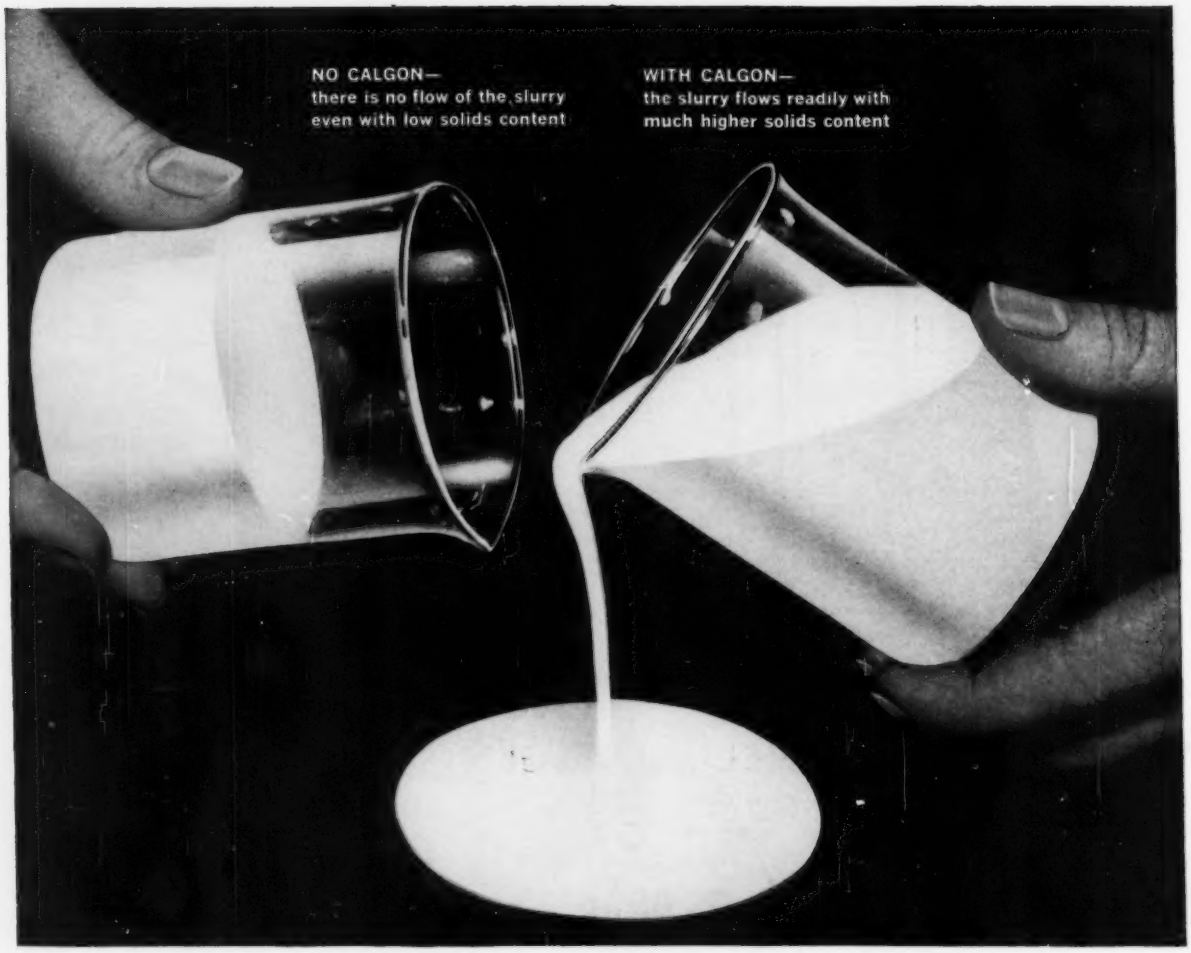
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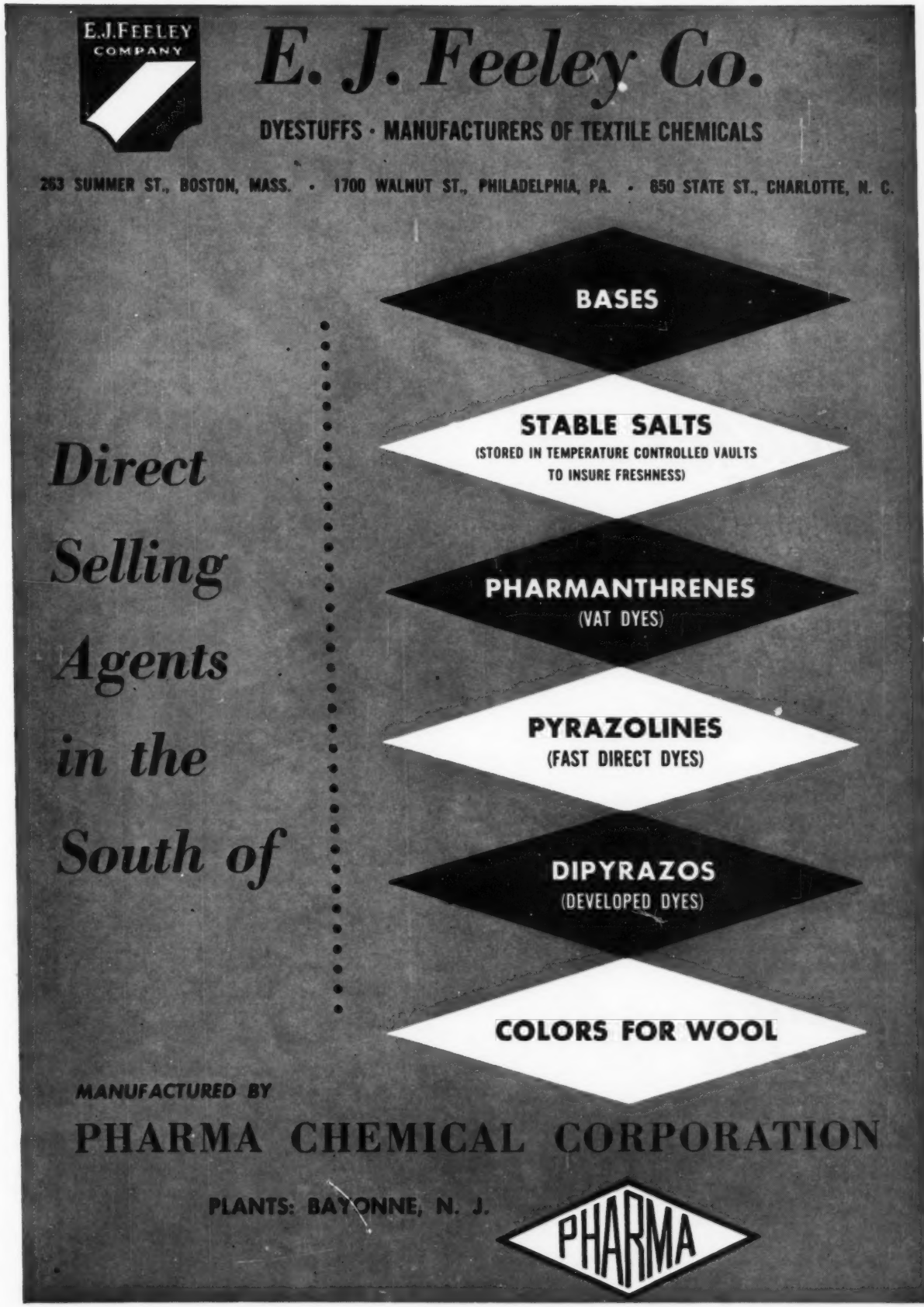
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Creativity is one facet of the story of Munsingwear, Inc, a company founded on an idea, nurtured on vision, and growing to great strength on its research.

Today Munsingwear is a giant in its industry, grossing more than $45,000,000 in sales in 1960 and moving into its seventy-sixth year with confidence and imagination.

George Munsing's idea—for plating silk over wool to eliminate the "itch" in underwear three quarters of a century ago—was good enough to set a fledgling young company in business, and practical enough to provide the base upon which the original firm could expand.

Since 1886, research has been a cornerstone of Munsingwear's growth. Despite the company's dependence on the results of research, however, the first formal organization of this effort did not take place until 1933. But all through the years, the creative development of products and processes made possible Munsingwear's leadership in fashion and sales. Diversification has been emphasized.

Research at Munsingwear is of several varieties, eg, machine, knitting, cooperative, design and market, etc.

In the dyeing and finishing research area, suppliers such as the DuPont Company give Munsingwear major help in this area, providing both laboratory assistance and trained personnel to research and answer various questions. To carry out its research in this field, Munsingwear has an elaborate dyehouse laboratory, complete with such varied equipment as a Fade-Ometer to check for colorfastness, chemical research facilities, and up-to-date home laundry equipment, used to determine how fabrics and dyes will stand up under repeated normal laundering conditions.

Much of the credit for the rapid growth and advanced outlook of Munsingwear in the last quarter century must be given to a quartet of executives, including George D McConnell, current president, Laurens D Dawes, now executive vice president of the Hollywood Vassarette Division, and former presidents Ernest Olrich and Coy C Humphrey.

McConnell

Munsingwear, Inc, has been headquartered in Minneapolis since its founding 75 years ago (1886). The home office and principal plant of this manufacturer of underwear, sleepwear, lingerie, hosiery, sport shirts and sweaters is on a site occupied by the company since 1890.

The present structure occupies an extra-large city block covering more than three acres on the edge of downtown Minneapolis, and includes the corporate offices, design studios, research laboratories and manufacturing facilities for three divisions: Men's and Boy's, Women's and Girls', and Fabric.

•

Permission to Use 201 Dyes as Colorants for Food Packaging Sought by SOCMA

The Synthetic Organic Chemical Manufacturers Association on February 10 filed a petition with the U S Commissioner of Food and Drugs, Department of Health, Education and Welfare, for the issuance of a regulation permitting the use of 201 synthetic organic dyes proposed to be used as colorants in paper and paperboard intended for food wrapping or packaging.

The petition states that members of SOCMA and nonmember dye manufacturers throughout the country, in cooperation with manufacturers of paper and paperboard in the United States, have, for almost two years, been engaged in testing the safety of these dyes when they are used to color paper or paperboard used for food packaging. Representatives of the Food and Drug Administration were consulted in order to establish test standards to make certain that dyes so employed will be safe in use, manufactured in accordance with good manufacturing practices, and otherwise conform with the language and intent of the Food Additives Amendment of 1958. The test methods have been submitted to FDA as part of the petition.

According to a spokesman for the Association, dye manufacturers throughout the country were circulated by SOCMA and informed of the program, and their cooperation was requested.

•

TRI Announces Program for 31st Annual Meeting

The program of Textile Research Institute's 31st Annual Meeting, to be held at the Commodore Hotel in New York March 16-17, has been completed, according to George H Hotte, chairman of the meeting and director, Fiber Sales and Service, National Aniline Division, Allied Chemical Corp.

Five papers will highlight the Thursday, March 16, sessions, which will be conducted under the chairmanship of Norman C Armitage, chairman of the Institute's General Research Advisory Committee and vice president, Deering Milliken Research Corp. These will be as follows: "An Automatic Doffing System for Spinning Frames and Twisters" by Robert W McCullough, product manager, Deering Milliken Research Corp; "Problematics in Reactive Dyeing" by Jacques E Wegmann, Ciba Ltd, Basle, Switzerland, and currently with the Applications Laboratories, Toms River Chemical Corp; "Some New Interpretations of the Tire Cord Fatigue Phenomenon" by W G Klein, W J Hamburger, and M M Platt, Fabric Research Laboratories, Inc; "Effect of Radial Heterogeneity on Fiber Properties" by R W Singleton and M A Sieminski, Summit Research Laboratories, Celanese Corporation of America, and "Polypropylene Textile Fibers" by Gilman S Hooper, director of research and development, Fiber Development Department, Hercules Powder Co.

The Thursday luncheon talk, "Research Trends in the Pulp and Paper Industry" will be given by Lincoln R Thiesmeyer, president of the Pulp and Paper Research Institute of Canada.

The Friday morning session, conducted under the chairmanship of William E Clark, retiring chairman of the TRI Board of Trustees and vice president and general manager, Textile Division, United States Rubber Co, will include a

brief report on the State of the Institute by J H Dillon, TRI president, followed by four papers on various phases of current TRI research presented by J H Dusenbury, W J Lyons, L Rebenfeld, and R F Schwenker Jr, associate research directors of the Institute. The final Friday luncheon session will feature an address, "What About These Soaring Sixties?" by Dexter Merriam Keezer, economic advisor and member of the board of directors of McGraw-Hill Publishing Co.

In addition to the above program, the meeting will provide an exhibit of modern research instruments and recent developments in the textile field.

The meeting is open to all persons who are interested in textile research and education, regardless of their affiliations with TRI. Reservations for attendance should be sent to P C Alford Jr, Textile Research Institute, PO Box 625, Princeton, NJ. The registration charge for the entire meeting is $10 and the cost of each of the two luncheons is $6.

●

U S-Western European Cooperative Program Established for Wider Distribution of Translations of Soviet Bloc Technical Material

A new cooperative effort between the United States and a number of European countries to provide broader Western World distribution of translations of Russian and other Eastern European scientific literature that may be useful was announced last month by John C Green, director of the Office of Technical Services of the US Department of Commerce.

A European Translation Center, sponsored by 12 member countries of the European Productivity Agency, has been established at the Technical University at Delft, Netherlands. It will provide liaison among European countries handling Russian and East European translations: serve as a center for bibliographic information on the availability of translations: and collect noncommercial translations from countries prepared to contribute them.

The Office of Technical Services, which is the U S Government's center for the collection and distribution of translations and related information, is currently assisting the European Translation Center in establishing its procedures for bibliographic and other work. OTS and the European Translation Center will exchange both translations and bibliographic data, and will use uniform methods of classification of the materials. It is contemplated that the OTS publication, *Technical Translations*, will be used as the announcement medium for material collected by the European Center, which should greatly increase the circulation of the publication in Europe.

Since 1958 the Office of Technical Service has been collecting and distributing translations prepared by US Government agencies for their own use. It also gathers and publishes information on translations in progress or completed which are available from any other source in the United States, public or private. Among the translations for which OTS provides announcement and reference service are those collected from Translations Collection Center at the John Crerar Library in Chicago.

In cooperation with the SLA Center, the Office of Technical Services began publishing *Technical Translations* in January 1959 to announce translations available from OTS, SLA, and other sources. It is published twice a month and sold by Superintendent of Documents, U S Government Printing Office, Washington 25, DC, at $12 a year ($4 additional for foreign mailing).

The Europeans estimate that their contributions of bibliographic information to *Technical Translations* will add 10 to 15 percent to the volume of listings in this publication in the first year of the European Center's operation, and that they will eventually double the size of the publication. *Technical Translations* now announces about 500 new translations in each issue.

The Netherlands Government is providing financial support for the European Center. The Center will operate under the legal authority of the Foundation for Scientific Literature Difficult of Access, of which L L Van der Wolk, director of the Library of the Technical University at Delft, is president.

Formation of the Center was fostered and encouraged by the European Productivity Agency of the Organization for European Economic Cooperation, with the advice and support of the US National Science Foundation.

Taylor Instrument Opens Mexican Subsidiary

The newest of Taylor Instrument Companies' subsidiaries will begin operations in April. Taylor Instrument Mexico, SA is located less than six miles from Mexico City.

Frank Ward, vice president of foreign operations, has named Edward J Hanna of Rochester to the post of general manager. Hanna joined the Company in 1926 and spent most of his career as an application engineer.

The new company will do some local manufacturing and handle instrument assembly and repair. To the present the Taylor operation in Mexico has been handled by Martinez S de R L. Personnel from this organization will continue to handle sales in Mexico.

The new company brings to a total of eight the number of Taylor subsidiaries operating throughout the world.

●

Monsanto Supplying Nonyl and Dodecyl Phenols from Kearny

Monsanto Chemical Company is now supplying quantities of nonyl phenol and dodecyl phenol from its Kearny, NJ, plant.

The products, manufactured in recently completed alkyl phenol facilities at Kearny, are widely used as intermediates in the manufacture of nonionic surfactants.

Monsanto also manufacturers alkyl phenol-based ethylene oxide condensates, which it markets under the trade name Sterox. These products are used in the textile industry for cleaning, lubricating, dye leveling, fulling and scouring.

●

Althouse Maintains Sales Pace, Introduces New Products

Althouse Chemical Company was described as doing "an outstanding job in maintaining its sales volume at a steady pace during 1960 despite recessionary pressures".

This analysis of the organization's sales picture was contained in an address by Felix A Buskey, Althouse's executive vice president and general manager, at the company's 2nd annual sales meeting held at the Wyomissing Club, Reading, Pa.

Mr Buskey said that sales were somewhat slowed by the cutback in automobile production. He said this resulted in loss of sales in the body cloth dyeing area.

"Housing starts——off 400,000 from the 1959 pace", he said, "was felt in a shrinkage of the upholstery and drapery market."

The Reading executive said that with the addition of Cekryls and Altofluors "to the Althouse line, we are moving in the direction of new fiber trends."

At the same time, he announced additions to the Company's Lanafast, Nylanthrene and Superlitefast lines.

Turning to 1961 prospects, Mr Buskey said that the "general state of the textile industry indicated that sales volume in the first six months of 1961 will be approximately that of the first half of 1960."

"I look for a gradual firming of business for the last half of the year," he said.

Frederic W Howe Jr, president of Crompton & Knowles Corp of which Althouse Chemical Co is a division, called the Althouse Company the "keystone of the parent company's diversification program started in 1954, the year of Althouse acquisition."

He singled out Harold Gift, sales service manager; Otto Putnam, plant manager; and George Garcelon, research director, for being key factors in Althouse's progress in the dyestuff industry. He also described the Althouse sales force "as the best in the business".

Edward Kent, Althouse's sales manager, presided.

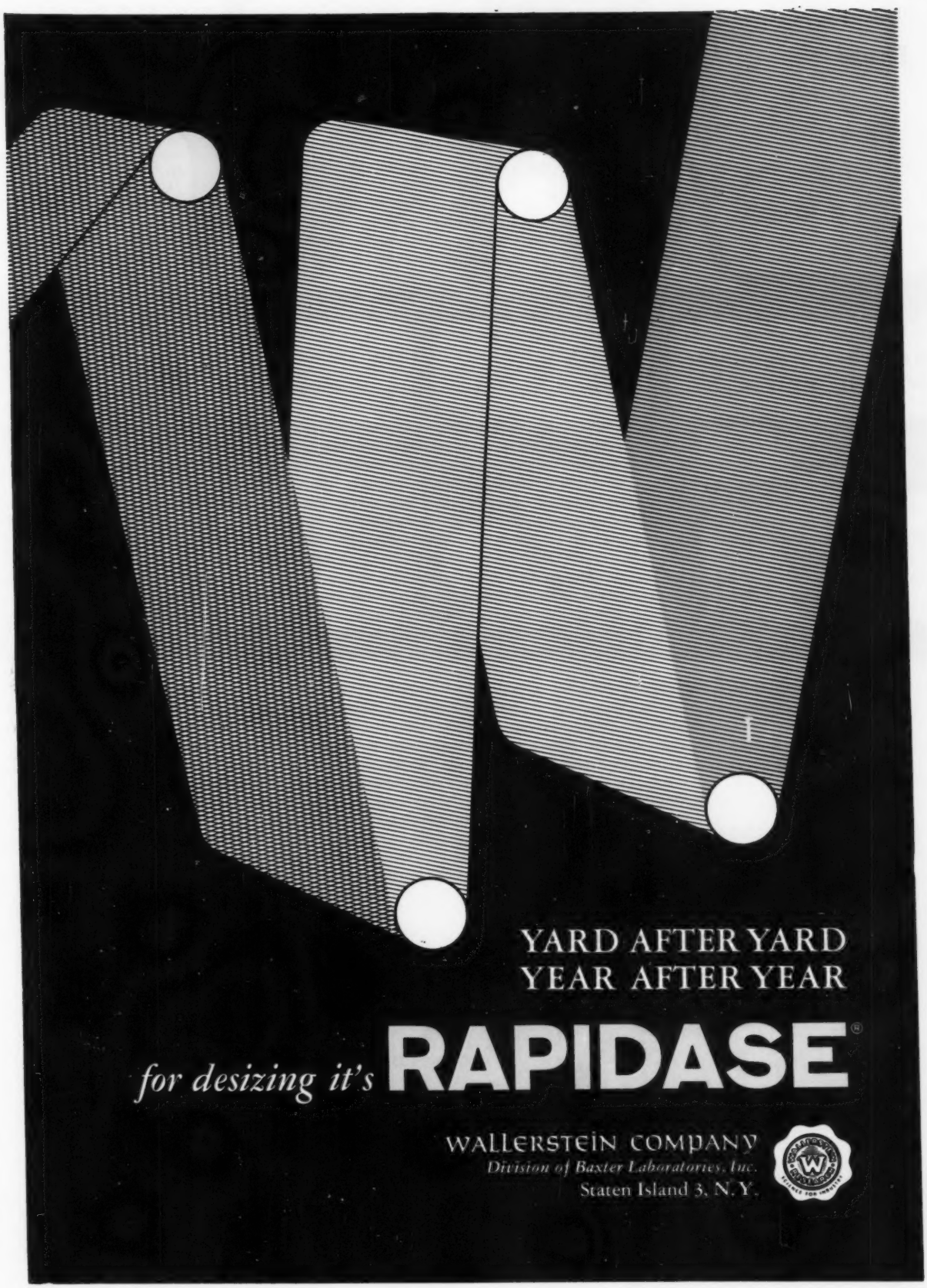
●

Carbide's New Animes Unit Producing Variety of Chemicals

Completion of a new unit for producing alkyl amines has been announced by Union Carbide Chemicals Co. The new unit, located at the Company's South Charleston, W Va, plant is designed to produce a variety of nitrogen products, and its flexibility reportedly will enable Carbide to take advantage of future growing markets.

Ethyl, butyl, and isopropyl amines are now being manufactured as markets for them develop.

Alkylamines are used in the synthesis of crease-resistant resins for textiles.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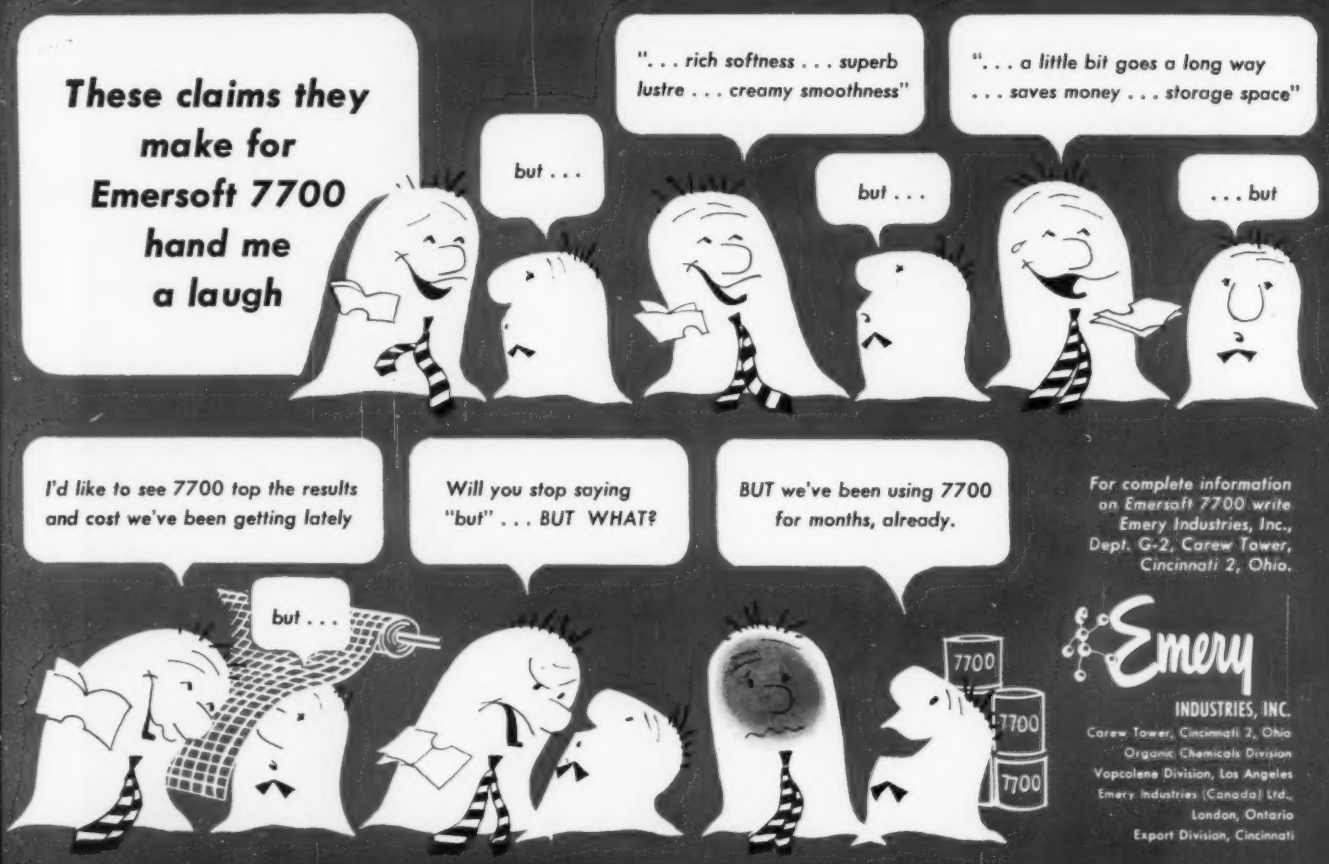
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Chemstrand Research Center Dedicated

Chemstrand Research Center, Inc was dedicated at Durham, NC, on February 1, with appropriate ceremonies and a host of dignities in attendance.

Secretary of Commerce and former North Carolina governor Luther Hodges, one of several speakers for the occasion, declared that research is and will continue to be a vital factor in strengthening the nation's economy and its ability to meet the challenges of world-wide competition.

The new research organization, a wholly owned subsidiary of The Chemstrand Corporation, was the first large installation completed in North Carolina's Research Triangle Park.

Paul M Gross of Duke University, president-elect of the American Association for the Advancement of Science, declared—"This magnificent new laboratory is tangible evidence of the Company's broad thinking and careful planning to insure the effectiveness of its industrial research program which is literally the life blood in a modern technical enterprise".

Edw A O'Neal Jr, president of The Chemstrand Corporation, pointed out that through the efforts of private enterprise, "research in the United States has been brought from a haphazard activity in an out-of-the-way corner of the plant to a formal activity which is a recognized arm of industry".

Mr O'Neal added that industry annually spends billions of dollars in research. That reward for this effort, he said, comes in the form of discoveries, processes and products which become the temporary property of the company, protected by the United States patent system.

"This patent system", he said, "furnishes the vital incentive to private industry to encourage continuous research effort and thus insures that our free economy will remain a dynamic force in the competitive world of today".

Declaring that the advance of science had reached almost explosive proportions, David W Chaney, executive director of Chemstrand Research Center, Inc, pointed out that about 90 percent of all the scientists who ever lived are alive today.

He said the new Research Center represents an effort to provide scientists with the finest facilities "available for the specialized fields of work in which we are engaged".

The more than 200 guests, from all parts of the nation, were welcomed to North Carolina by Governor Terry Sanford.

After the dedication ceremonies, they toured the modern new laboratories and heard research scientists explain some of the work in progress.

Chemstrand Research Center, Inc, is located on a 105-acre tract in the Research Triangle Park. Research activities of The Chemstrand Corporation, the world's second largest producer of chemical textile fibers, were transferred there from Decatur, Ala, after the formation of the new research subsidiary.

One of the newest of the industrial research organizations, Chemstrand Research Center, Inc, was organized in the Fall of 1959 as a wholly owned subsidiary to serve as the fundamental research arm of The Chemstrand Corporation.

O'Neal

Chaney

Construction of multi-million dollar new facilities in North Carolina's Research Triangle Park and the subsequent relocation of research personnel and equipment from Decatur marked a major milestone in the 10-year growth pattern of Chemstrand.

The new Center is a modern structure of steel, glass and brick, containing more than 19,000 square feet of floor space and designed to accommodate some 500 persons. Laboratories were designed to implement the latest concepts in efficiency and comfort and are completely air conditioned. The Center is designed to accommodate 91 research laboratories, of which 65 are in operation. These do not include service labs and shops. In addition, there is a modern library containing some 37,000 technical volumes; executives' offices, conference rooms, and a cafeteria with a seating capacity of about 250.

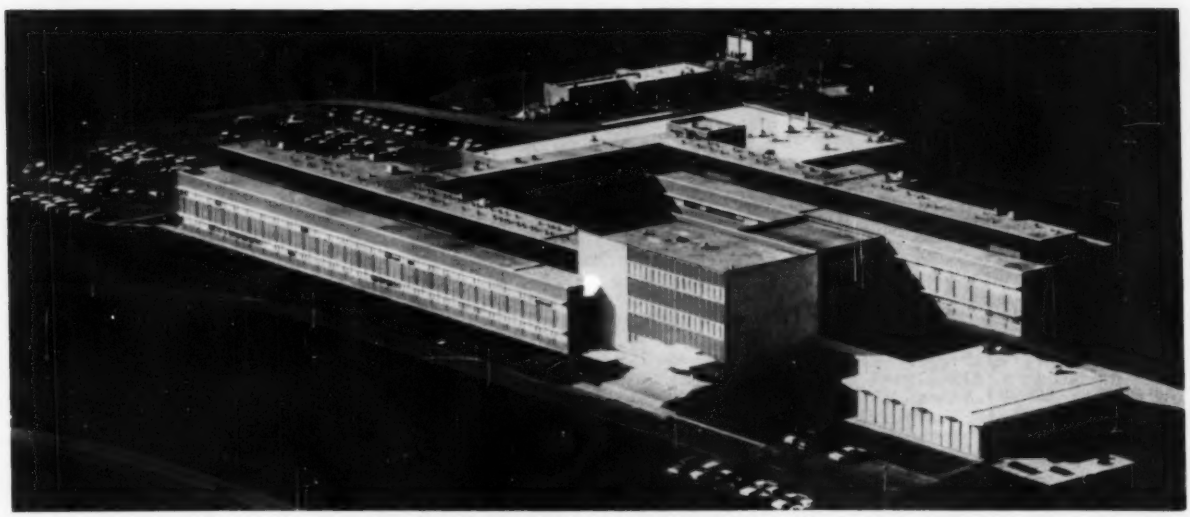
Chemstrand Research Center, Inc is invested with the responsibility of discovering and developing to the stage of "demonstrated promise" new and improved products and processes of interest and value to the Corporation.

To accomplish these goals, Chemstrand Research Center is organized into four major departments—Basic, Exploratory, Products, and Administration.

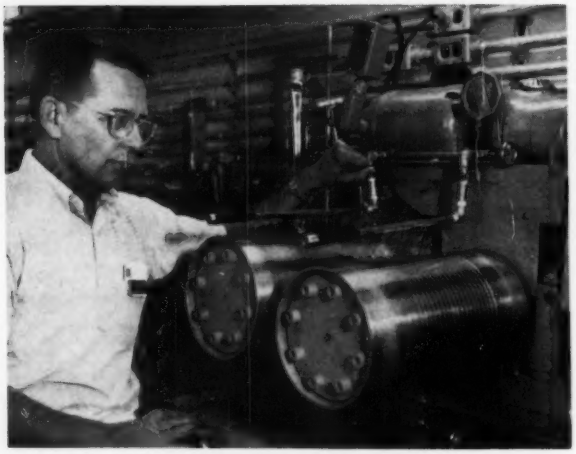
Basic Research probes into the structure of matter and provides a fundamental knowledge vital to development work. Accumulation of fundamental knowledge establishes the solid foundation so necessary for building research programs.

Exploratory Research seeks to find ways of applying this knowledge to emerge with new concepts. From this department come the candidates which some day may enter the market as new products of The Chemstrand Corporation.

Products Research takes existing fibers and makes them better, applies new finishes or develops ways to impart better dyeability or stronger resistance to wear and other elements. Industrial firms such as Chemstrand invest heavy capital in existing products, and must constantly be alert to opportunities for creating new end-uses—and consequently new markets.



Aerial view of Chemstrand Research Center, Inc



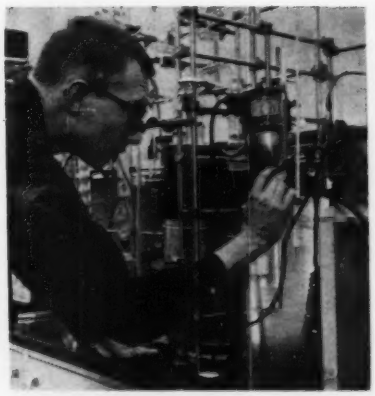
Laboratory spinning of chemical fibers

Molecular structure of chemical compounds is studied by research scientist using a nuclear magnetic resonator which traces hydrogen nuclei in the chemical compound under study.

Measurements as close as one part in 22-trillion are possible with this complex scintillometer. Radio-isotopes are used to tag atoms in a chemcial compound. The tagged atoms are then measured for location in the molecule.

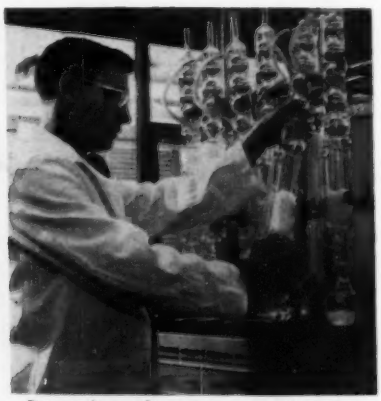
Traditional microscopes are used to prepare samples for extremely detailed measurements with electron microscopes and X-ray equipment.

A tiny sample of an experimental man-made fiber undergoes a strength test. The star effect is caused by light reflectance from the holder securing the single fiber.



A researcher checks the temperature of a solution in an experimental control tank. Closely controlled temperatures as low as —65°F are possible.

Two researchers take readings from a fractionating tower of a new chemical compound under test.



Researcher observes a reaction in a complex glass apparatus specially constructed by glassblower at CRC.

The Administrative Department provides research service and staff support to the operation of the Center. Technical Research performs both research and service and has teams working to improve methods for fiber characterization and to develop better methods for instrumentation and testing. Other specialists in this department keep an eye and ear trained on technical developments in other areas of the nation and world. Staff units such as Personnel, Purchasing, Community Relations, Engineering, Safety and Accounting contribute important roles toward completing the over-all Center staffing.

Represented among Chemstrand personnel are chemists, physicists, engineers, and technicians and specialists of wide varieties.

Some 21 sites were considered before The Chemstrand Corporation selected the Research Triangle Park as the location for its new Center.

Research Triangle Park is centered in a geographical

triangle formed by the cities of Raleigh, Durham and Chapel Hill. The educational institutions in these cities engendered the now-famous "Research Triangle" designation. Raleigh is the home of North Carolina State College, Durham of Duke University and Chapel Hill of the University of North Carolina.

A program to encourage independent creative research effort by scientists of proven exceptional ability within Chemstrand Research Center, Inc has been put into effect by the organization.

The new plan provides special incentives and promotions for the scientist who prefers to function largely on his own—free of time-consuming administrative burdens.

Traditionally, management has rewarded men with ability by promoting them into managerial positions. Too often, the most creative minds in industrial research have been lost to direct participation in research efforts as scientists' energy and creativity have been drawn into a tangle of administrative duties.

The Chemstrand plan allows a scientist to dedicate his efforts to direct research, and at the same time win recognition through promotion and increased compensation. This organizational structure is sometimes called a "technical ladder".

It established four positions which are, in order of rank: Senior Staff Scientist, Staff Scientist, Scientist, and Associate Scientist. These correspond as equivalents to the administration positions of Director, Manager, Section Head and Group Leader, respectively.

The long range goal of this program, according to Dr Chaney, is to assure that Chemstrand maintains the best scientific team possible to meet the stiffening competition and challenges presented by an expanding world technology.

●

Celanese to Manufacture Acetyls by New Process

Celanese Corporation of America announced January 27 that it will become the first U S company to make chemicals from petroleum resources by a new European process.

Harold Blancke, chairman, said the process provides a new route for the economical manufacture of acetyls, a family of widely used chemicals formed by certain combinations of oxygen and petroleum gases. Celanese, one of the world's largest manufacturers of acetyls, has licensed the process from Aldehyd GmbH, a company jointly owned by the German chemical firms of Farbwerke Hoechst and Wacker Chemie.

Celanese now makes 30 chemical derivatives of the acetyl family, with annual production exceeding 500,000,000 pounds.

Mr Blancke said the new process will be used at a multimillion-dollar plant to be built on a 1,000-acre site near Bay City, Tex. Construction reportedly will start in the second quarter of 1961 and will be completed within a year.

The new process involves the combination of oxygen with ethylene gas in the presence of a catalyst.

James H Worth, president of Celanese Chemical Co, a corporate division, said the principal product to be made by the new process at Bay City will be acetaldehyde, the starting point for the production of many other acetyl chemicals. The new plant's production will back up current acetaldehyde manufacture by other processes at two existing Celanese chemical plants in Bishop, Tex, and Pampa, Tex.

Initial facilities at Bay City also will include units for the making of 2-ethyl hexanol, the latest addition to the Celanese line of acetyls. Manufacture of 2-ethyl hexanol, currently conducted at Bishop, will be transferred to Bay City as soon as the new facilities are completed.

●

TRI Seminar Speaker Named

R A Gill, Rohm & Haas Co, Philadelphia, Pa, will discuss "Properties of Viscose Rayon as a Function of Swelling and Temperature" on March 30 as third speaker in Textile Research Institute's Spring Seminar Series.

In his address, Mr Gill will discuss measurement of the glass-transition temperature (Tg) as a function of swelling. The effects of crosslinking on Tg value and on resilience will also be considered.

The TRI Seminar series will continue on April 13, May 4 and May 18 in the Edward T Pickard Room, Textile Research Institute, Princeton, NJ, at 2:30 pm. Advance notice to L Rebenfeld of planned attendance will be appreciated.

AATT's Annual Conference Well Attended

The first Annual Conference of the American Association for Textile Technology Inc, held February 8 at the Hotel Commodore, New York, NY, attracted well over 500 technologists.

Under the theme "The Challenge of Modern Fiber Technology", the Conference was designed to help clarify the responsibilities of producers, processors, distributors and consumers interests in the use of new and improved fibers and their end-uses. In a speaker-panel format, it examined closely many of the problems confronting the textile industry, retailers, consumers and service trades resulting from the profusion of textile fibers and fiber modifications in the world market today. Questions for the panelists were drawn in advance from registrants.

The program featured four panel discussions: Retailer, End Product, Converter, and Mill Operations; a banquet luncheon; and a summary speaker.

During the banquet-luncheon, J M Cheatham, president of Dundee Mills, Inc and president of the American Cotton Manufacturers Institute, discussed the world outlook in terms of its effect on fiber technology and the development of new textiles. His address was followed by business formalities, including the installation of new officers and directors of AATT, and the granting of awards.

Summary speaker was William E Clark, vice president and general manager, Textile Div, U S Rubber Co, who drew the day's discussion together into an overall appraisal of the future.

●

ARS Rearranges Utilization Research and Development Division

Three new research laboratories have been created at the U S Department of Agriculture's Southern Utilization Research and Development Division, according to C H Fisher, Division director. The new laboratories reportedly were created out of existing laboratories to afford the Division more efficient research planning and operation, with added emphasis on basic research as well as commercialization of new developments.

Under the new organization, the research of the Division will be done in 10 laboratories, each under the leadership of a scientist who is a specialist in the field. The new laboratories are: Cotton Chemical Reactions Laboratory, with W A Reeves temporarily acting as laboratory chief; Cotton Physical Properties Laboratory, with assistant division director C L Hoffpauir temporarily acting as laboratory chief; and the Naval Stores Laboratory with R V Lawrence as chief. The Naval Stores Laboratory is a field station of the Division and is located at Olustee, Fla.

Research teams are necessarily close-knit groups, and the new plan is designed to take full advantage of this teamwork. The new organizational framework also more clearly defines the research areas of each laboratory. Laboratories in turn are broken down into investigations, each with a specific task in the search for new products from Southern-grown agricultural commodities.

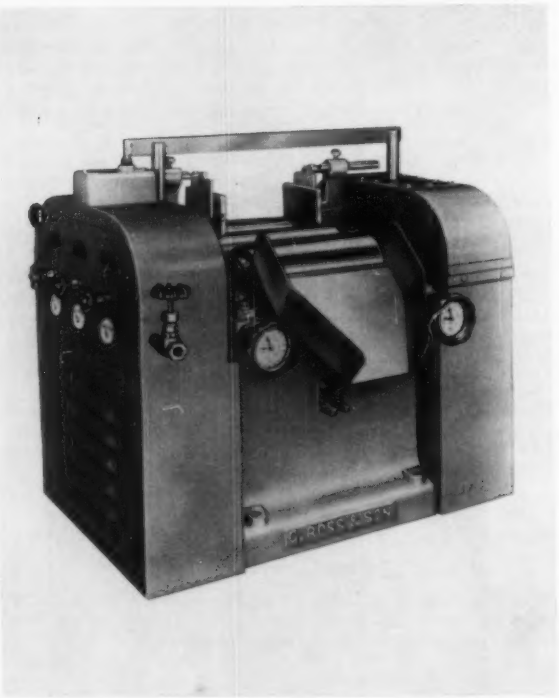
Other laboratories and laboratory chiefs or research leaders of the Southern Division are: Seed Protein Pioneering Research Laboratory, A M Altschul; Plant Fibers Pioneering Research Laboratory, Carl M Conrad; Cotton Finishes Laboratory, W A Reeves; Cotton Mechanical Laboratory, R J Cheatham; Oilseed Crops Laboratory, T H Hopper; Food Crops Laboratory, V H McFarlane; and Engineering and Development Laboratory, E L Patton.

The new Cotton Chemical Reactions Laboratory will be concerned primarily with exploratory and basic research and will include the search for new chemicals to impart special properties to cotton, and research to obtain basic information on the changes induced in cotton products by exposure to high energy radiation. The laboratory was formerly a part of the old Cotton Chemical Laboratory, which has been renamed Cotton Finishes Laboratory.

The Cotton Physical Properties Laboratory, as the name implies, will concern itself with fiber physics, both optical and electron microscopy, spectroscopy, and textile testing.

The Naval Stores Laboratory, formerly apart of the Industrial Crops Laboratory, which is now known as the Oilseeds Crops Laboratory, will continue to concern itself solely with pine gum and its derivatives.

Agricultural utilization research for the Southern region has centered in New Orleans since the opening of the Southern Regional Research Laboratory in 1941.



Charles Ross & Son Co's three-roll mill

Positive Adjustment Controls on Three-roll Mill

New high-speed three-roll mills fitted with roll-pressure recording gauges and automatic thermostatic-controlled water inlet valves have been introduced by Charles Ross & Son Co, Inc, 148 Classon Ave, Brooklyn 5, NY. These features incorporated into the mills are said to give more precise control over roll adjustment and temperatures for producing the finest dispersions. The pressure-recording gauges built into each adjusting handwheel are said to assure positive parallel roll settings for uniform dispersions and to eliminate wear on rolls. The gauges reportedly enable returning to predetermined roll settings and insure the same results.

Mills in sizes from 4½ × 10" to 16 × 40" are provided with automatic thermostatic control of main inlet or water cooling line for limiting the heat of rolls to a preset temperature between 40°-180°F. When roll temperature exceeds the temperature it is set for, the water inlet valve is automatically opened to allow greater water cooling to reduce the roll temperature to the preset temperature.

According to the manufacturer, these features have proved on many installations to give greater quality control and uniformity of product; while also increasing production from the mill. Further detailed information is available from the manufacturer on request.

•

Improved Intermediate for Dyestuffs

Allied Chemical's National Aniline Division is now producing an intermediate for use in dyestuff manufacture and as a curing agent for epoxy resins, which, it claims, is more stable under accelerated heat tests and considerably lighter in color. The product, meta phenylene diamine, ranges from light gray to tan flakes. It reportedly has no ammonical odor and offers a setting point of 62.6% minimum, strength to 99.3% minimum and is insoluble in hydrochloric acid to 0.1% maximum.

Permachem Being Used in Wide Variety of Products

Permachem germicide-fungicide, only two years after its first medically reported success in combatting epidemic cross-infection in hospitals, is now being incorporated into a wide variety of textile products.

As a "purifying finish," Permachem is said to be providing important advantages in addition to its germ-killing effect. Decomposition and deterioration are either completely prevented for the life of the textile, or greatly reduced, it is claimed. This reportedly includes rot, mildew, and mold, as well as stains, discoloration and disfiguration of the material due to loss of tensile strength. Permachem is also said to prevent odors caused by perspiration, bacteria and fungi.

According to the manufacturer, Permachem Corp, 342 Madison Ave, New York 17, NY, the product protects the consumer by killing on contact the full spectrum of contagious germs and fungi ranging from the most virulent bacteria to the commonplace athlete's foot fungus.

A number of major manufacturers are said to have already incorporated Permachem or are researching its applicability to such products as clothing, carpets, mattresses, upholstery, blankets, shoe linings, and seat covers used in transportation, etc. The importance of Permachem to baby clothing, bedding, toys and other nursery products using textiles, is an area of particular emphasis.

Mills are using Permachem in the wet-finishing operations. It reportedly may be added in a padding operation, in the dyebeck, or incorporated with starch sizes, softeners, and various types of resins used in "wash-and-wear" and water-repellent finishes. When Permachem is incorporated in this manner, there are no extra processes necessary or additional labor required, it is stated.

In the dyeing process, Permachem of a cationic nature is added to the dyebeck along with the dyes in the last rinse cycle with a retention time of ten to fifteen minutes at a temperature of 140° to 160°F. Permachem may also be applied to tubular knit goods in the Tubetex finishing machine or used in the treating of yarns and chord by application in the package dyer, as well as other concentrated methods of dyeing.

Application of Permachem is said to be accomplished at a relatively low cost—an average of one and one/half cents per pound of textile treated. This cost varies slightly with the nature of the weave and the thickness of the material.

The permanent effectiveness of Permachem in textiles is said to have been established by outside laboratories and universities. Current testing reportedly has verified full effectiveness lasting through 25 washings. Verification to 50 washings is anticipated by the producer in the very near future.

•

Lyogen WD

The release for sale of Lyogen WD, a newly developed, efficient leveling agent for the dyeing of wool, has been announced by Sandoz Chemical Division. The product is being recommended by Sandoz for use with acid dyes in particular, milling dyes, and also for chrome dyes.

The milling and neutral (metallized) dyes normally applied from a neutral bath can now be dyed perfectly level in an acetic acid or phosphoric acid bath with the assistance of Lyogen WD, it is claimed. Because of the acid pH, wool dyeings reportedly will be noticeably brighter in tone, since yellowing of the fiber is avoided.

Application of Lyogen WD is also said to permit the dyeing of neutral and weakly acid dyeings in one bath at a pH between 4 and 5 (the conditions most favorable to wool) and to ensure completely level and nonskittery dyeings.

The chemical also is said to facilitate use of certain chrome dyes which have pronounced tendencies towards skittery and unlevel results. Its retarding and leveling action has proved useful, too, in the dyeing of silk and polyamide fibers with milling dyes.

Abstracts

(continued from page 52)

Two detergent compounds which may be employed in the laundering operation are proposed by the author for overcoming the discoloration problem. One is a simple mixture of detergents containing a complex phosphate, which can be prepared by the laundry. The other, a salt of dodecylbenzene sulfonic acid containing a trace of SO_2, is more effective, but its production lies essentially in the province of a specialist detergent manufacturer. Both have been extensively tested in full-scale laundry trials.

Large-scale boiling of shrink-resistant all-wool blankets, using the described detergent mixtures, has now been carried out in Melbourne for over a year, and it has proved to be a trouble-free, practical method of producing clean, boiled wool blankets for hospital use. Individual blankets have withstood one hundred high-temperature washing cycles and are still in excellent condition.

Nineteen references to the literature are cited.

●

Chlorite Bleaching of Cotton

Higginbotham, R S and Leigh, R A, *Dyer 124, 986-7, Dec 30, 1960*

It is obviously of interest to determine how much chlorite is actually used and how much is lost by side reactions under various conditions of bleaching cotton. These matters have been investigated at the Shirley Institute.

The proportion of chlorite used in bleaching increases with increasing pH; no chlorine dioxide is lost above pH 5.5, and no chlorate is formed at pH 8.5. It might be concluded that bleaching should be carried out at about 8.5 to secure the greatest economy in chlorite consumption, but this is not practicable, the authors say, for two reasons:

First, the speed of bleaching decreases with increasing pH, and the practicable limit is reached at about pH 5.5. Second, neutral or alkaline or solutions of chlorite have more tendency to attack cotton than weakly or moderately acid solutions. The best pH to use is about 5.5, but limitations imposed by plant design or bleaching method may necessitate the use of lower values down to 4.

It is very desirable to work at the highest pH possible because ClO_2 evolution is minimized or eliminated and troubles due to its toxic and corrosive properties may be largely avoided.

Chlorite is particularly suited for bleaching blends of cotton and man-made fibers, being more versatile than peroxide, the authors state. For example, a brocade with a diacetate warp and seedy cotton filling, now in considerable production, can only be bleached satisfactorily with chlorite.

The authors describe several methods which have been developed for chlorite bleaching. One method utilizes a kier, which is lined with chemical-resistant tiles and fitted with a stoneware circulating and heating system. The bleach liquor has a pH of 4.8 at the start and a final pH of 4. Bleaching takes four to six hours at 85°C.

Another method for goods in rope form employs a J-box made of stoneware resistant to chemicals and thermal shock. Here again the pH is about 4; the bleaching time is 1½ hours. A hot treatment with soda ash follows.

Both continuous and semicontinuous methods are available for open-width fabrics, all based on the pad-steam principle. The continuous method has a disadvantage in that considerable ClO_2 is liberated. The semicontinuous method, which is recommended, can be worked at a pH of 5.5, and steaming times two to four hours are easily achieved.

●

Lightfastness and Surface Activity of Dyes: the Effect of Alkylation and of Sulfonation

Giles, C H *et al, Textile Research J 30, 934-43, Dec, 1960*

Surface-active dyes having molecules substituted with long paraffinic chains are of technical importance in wool dyeing. The substituents reduce the diffusion rates of the dyes, thus improving their washfastness on wool.

Weak surface activity is also exhibited by planar dye molecules which are sulfonated at only one end or along one side, the remainder of the molecule thus consisting mainly of a large hydrophobic group. Changes in surface activity of dye molecules, caused by either changes in the nature of attached alkyl chains, or changes in the positions of sulfonate groups or the presence of surface-active agents, may be expected to affect lightfastness, because the physical state of the dyes in the substrate will be disturbed.

In the present project several series of acid dyes of the sulfonated anthraquinone, sulfonated and unsulfonated azo, azomethin, and *mero*cyanine classes were exposed to light in transparent films (principally gelatin), and their fading rates and characteristic fading curves were determined. The results are tabulated.

The light employed in most cases was from mercury-vapor lamps. A few tests were made with a xenon lamp, which gives a continuous spectrum resembling skylight. Absorption spectra and fading rates were measured on a spectrophotometer. Following is a brief summary of the results obtained.

A marked increase in surface activity of an ionic dye tends to *decrease lightfastness* in normal substrates. A smaller increase in surface-activity, eg, by introduction of a short alkyl chain, usually *increases* lightfastness. The orientation and number of sulfonate groups affects lightness. A more even distribution of such groups or increase in their number in the dye molecule improves the fastness; this rule appears to apply to most acid wool dyes. The effect of normal aggregation of the dyes in the substrate upon their lightfastness is apparently in most cases sufficient to mask differences in their chemical reactivity. The lower the solubility of a dye in a film before setting, the higher is its lightfastness; the higher the solubility, the lower the lightfastness.

Seventeen references to the literature are cited.

●

Du Pont Sponge-core Package-dyeing Process

Anon, *Dyes & Chem Tech Bull (Du Pont) 16, 51-9, Aug, 1960*

Du Pont technicians have developed a new and unique process for package dyeing which compensates for shrinking, swelling or bulking of yarns of all types during dyeing. Standard dye tubes of stainless steel, fiber or springs are inserted into sponge cores which are highly compressible and work toward relieving the forces created by the yarn during package-dyeing procedures.

The new process has been satisfactorily demonstrated on the following yarns: high-bulk Orlon, filament nylon and Dacron (not preshrunk), rayon, and mercerized cotton sewing thread.

Sponge-cores offer the package dyer a useful tool for eliminating the cost of preshrinking or bulking, depending on the yarn to be dyed, and the added coning operations resulting from these pretreatments.

Almost all experience to date has been with the use of Du Pont cellulose sponges having a special grain orientation designed for this particular end use. Polyurethane, rubber and other sponge materials are also being investigated.

Du Pont cellulose sponge cores are available in a range of sizes and thicknesses. After the proper size sponge is selected, it can be formed into a tube by gluing, stapling or sewing. Some difficulty may be experienced in inserting flexible springs into the sponge cores when they are dry, but there is no problem when they are wet.

Four or more reuses of the sponges are said to be possible, especially when temperatures are below 230°F.

When coarse-count high-bulk yarns of Orlon are package-dyed by the sponge-core method, the yarns are compressed on one another during shrinking. After the package is dried, the yarns, especially those next to the core, are elliptical in cross-section rather than round. The round cross-section can be restored by applying stress to the dyed yarn during backwashing.

Package-dyeing with the sponge cores has many new and diversified possibilities. Even rayon yarn has been satisfactorily dyed with vat dyes with excellent uniformity, it is said.

•

The Effect of Heating Wool Containing Alkali

Norton, G P and Nicholls, C H, *J Textile Inst*, 51, T1183-92, Dec, 1960

The purpose of this investigation was to ascertain the full extent of chemical changes occurring when wool is dried at elevated temperatures in an alkaline condition. Probably, one of the most significant effects of drying wool under these conditions is yellowing.

The yellow discoloration produced by drying wool containing alkali at elevated temperatures has been shown to be dependent on time and temperature of drying and the presence of strong alkali. The presence of mild alkali, eg, sodium carbonate, in the wool in amounts likely to occur in industrial processing was found to produce no yellowing additional to that produced by drying wool free of alkali under the same drying conditions.

The discoloration was shown to be sensitive to pH changes, being partly discharged by acid. It faded quite rapidly on standing in air and could be readily bleached with a mild oxidative treatment. Attempts to minimize the yellowing by the addition of oxidizing or reducing agents to the alkali, or by chemical modification of the wool, have proved unsuccessful.

Preliminary investigations into the mechanism of wool yellowing suggest that under mild conditions the discoloration results from cystine breakdown, but under conditions which produce more intensive discoloration, other amino-acid residues such as tyrosine may also contribute.

The authors state that while these conclusions are at the present time speculative, they do suggest a possible explanation of the yellowing behavior of wool and silk under neutral and strongly alkaline conditions. Heat alone discolors wool, which has a high cystine content, but has practically no effect on silk, in which cystine is absent. In the presence of strong alkali, heat also attacks tyrosine to produce a discoloration additional to that produced by the breakdown of cystine. Under these same conditions, silk with its high tyrosine content produces an intense coloration. Further support for this hypothesis comes from the fact that the discoloration of silk is completely discharged by acid, whereas with wool the discoloration is only partly discharged.

Twenty-three references to the literature are cited.

GENERAL CALENDAR OF COMING EVENTS

ACHEMA
June 9-17 (13th International Chemical Engineering Exposition and Congress———Frankfurt am Main, Germany)

AMERICAN CHEMICAL SOCIETY
Mar 21-30 (139th National Meeting, St Louis, Mo)

AMERICAN COTTON MANUFACTURERS INSTITUTE
Mar 23-25 (12th Annual Meeting, Fontainebleau Hotel, Miami Beach, Fla)

AMERICAN HOME ECONOMICS ASSOCIATION
June 27-30 (52nd Annual Meeting———Cleveland, Ohio)

AMERICAN OIL CHEMISTS' SOCIETY
May 1-3 (34th Annual Meeting, Sheraton-Jefferson Hotel, St Louis, Mo)

CHICAGO SECTION, AMERICAN CHEMICAL SOCIETY
Sept 5-8 (11th National Chemical Exposition———Chicago Amphitheatre, Chicago, Ill)

FIBER SOCIETY
April 27-28 (Spring Meeting———Georgia Center for Continuing Education, Athens, Ga)

INTER-SOCIETY COLOR COUNCIL
April 10-12 (30th Annual Meeting———Sheraton Hotel, Rochester, NY)

INTERNATIONAL TEXTILE MACHINERY EXPOSITION
Sept 1962 (3rd Exposition, Hanover, Germany)

KNITTING ARTS EXHIBITION
April 24-28 (Atlantic City Auditorium, Atlantic City, NJ)

NATIONAL COTTON COUNCIL OF AMERICA
Nov 8-9 (1961 Chemical Finishing Conference———Sheraton Park Hotel, Washington, DC); Oct 3-4, 1962 (1962 Chemical Finishing Conference———Sheraton Park Hotel, Washington, DC)

PURDUE INDUSTRIAL WASTE CONFERENCE
May 2-4 (16th Conference———Purdue Memorial Center, Lafayette, Ind)

QUEBEC SECTION, CANADIAN ASSOCIATION OF TEXTILE COLOURISTS AND CHEMISTS
Mar 18 (Physical Sciences Centre, McGill Univ, Montreal, Quebec); Apr 21-22 (Annual Meeting and Dinner, Sheraton-Mt Royal Hotel, Montreal, Que); June 10 (Annual Golf Tournament—Drummondville Country Club, Drummondville, Quebec)

SCHWEIZERISCHER VEREIN DER CHEMIKER-COLORISTEN
October 12-14 (Symposium on "Permanent Finishing 1961"——— Swiss Federal Institute of Technology, Zurich, Switzerland)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
Mar 14, Apr 13 (Luncheon Meetings———Palm Terrace Suite, Hotel Roosevelt, New York, NY); May 22-24 (Spring Outing——— Skytop Lodge, Skytop, Pa); June 13, Sept 12, Oct 10, Nov 14 (Luncheon Meetings———Palm Terrace Suite, Hotel Roosevelt, New York, NY); Dec 7 (Annual Meeting and Dinner———Hotel Roosevelt, New York, NY)

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY
Feb 20-23 (46th Annual Meeting———Hotel Commodore, New York, NY)

TEXTILE RESEARCH INSTITUTE
Mar 16-17 (31st Annual Meeting, Commodore Hotel, New York, NY)

UNION OF PURE AND APPLIED CHEMISTRY
August 6-12 (18th International Congress of Pure and Applied Chemistry———Montreal, Canada)

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PERSONALITIES IN THE NEWS

Kartoz

Malachowski

Kuniholm

Berridge

Winter

Scofield

Harry W Kartoz was elected vice president of Berkshire Color & Chemical Co, Reading, Pa, effective January 2, and *John Malachowski* has been named chemical group leader.

Mr Kartoz has been with Berkshire since 1954, most recently as supervisor of production. In his new post, he will be responsible for productive and research facilities at the Company's Reading plant.

Mr Malachowski has been associated with the dyestuff industry for the past 21 years.

●

David A Kuniholm has been appointed manager of the Textile Machinery Division of the Rodney Hunt Machine Co.

Mr Kuniholm served as manager of Rodney Hunt's Industrial Roll Division since 1951. He will continue to hold this post in addition to his new assignment. He has been with the Orange, Mass firm for 15 years.

●

Verona Dyestuffs, Union, NJ, has announced the retirement from active service of *W L Swenson*, vice president of the Corporation.

However, Mr Swenson will continue to act as consultant and will remain on the board of directors of Verona Dyestuffs.

●

CORRECTION

YOUR attention is called to a reversal of captions under two photos which appeared on page 59 of the January 23 issue under "Personalities in the News".

The item involved *William N Davies*, previously general manager of Interchemical Corp's Color & Chemicals Division, who has joined the headquarters staff as Interchemical vice president—sales, and *C Stanley Johnson*, who has succeeded Mr Davies as general manager of the Color & Chemicals Division.

In his newly created post, Mr Davies will specialize on the sales activities and diversification planning of the Corporation as a whole. His career with Interchemical started in 1927 and for about thirty years he was affiliated with its Printing Ink Division in various phases of sales and sales management. In 1957 he became head of the Textile Colors Division and in 1958 became general manager of the Color & Chemicals Division.

Mr Johnson has relinquished his duties as vice president of Interchemical's Printing Ink Division, with which he has been affiliated since 1931, to assume his new responsibilities. Since 1931 he has advanced through various positions in accounting, production, and sales. In 1959 he was appointed vice president—sales of the Printing Ink Division.

Davies

Johnson

Charles A Berridge has been named sales representative of the Silicone Products Department of General Electric, Waterford, NY. His office location will be 8555 East Florence St, Downey, Calif.

He joined General Electric on the Chemet Training Program in 1953 and was assigned to the Silicone Products Department as a development chemist the following year. In 1958 he moved to the rubber market development section, a position which he held until his present assignment.

●

Kurt John Winter, textile consultant, New York, and current president of the American Association for Textile Technology, has been appointed to the faculty of the Philadelphia College of Textiles and Science, Philadelphia, Pa, as a guest lecturer in textile finishing.

Dr Winter has been employed in the United States by E I duPont de Nemours and Co, Inc, Julius Kayser and Co and United Merchants and Manufacturers, Inc, from which concern he retired in 1959. He established his consulting agency shortly after retirement, and will continue in this activity from his office at 230 Park Ave, New York, along with his teaching responsibilities.

●

Vince Scofield has resigned as sales promotion manager at E F Drew & Co. Mr Scofield, originator of the Drewclad mothproofing advertising and promotional campaign, was formerly general manager of Sportime Fabrics, Inc, New York, and the boys heavy outerwear buyer at Montgomery Ward & Co.

He has not made known his future plans.

●

W F Fancourt Company has announced the transfer of *Robert Rhodes*, assistant secretary and director, to an operating base in Charlotte, NC. He formerly worked out of the company's Philadelphia office.

Rhodes will work primarily in the piece goods field from headquarters at 1126 Kings Drive.

●

Eight prominent textile executives from El Salvador visited the A French Textile School of the Georgia Institute of Technology on January 17.

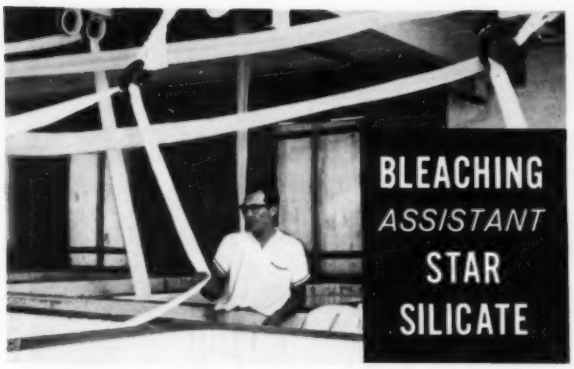
Sponsored by the International Cooperation Administration, the group spent the day observing the laboratories and talking to faculty members of the Textile School.

Included in the group were *Pascual Vairo*, president, "Intexsa Industrias Textiles, SA; *Murillo Hernandez*, secretary, Minerva Textile Union; *Garcia Ayala*, maintenance engineer, Industrias Unidas SA; *Salvatore Enrico Monteforte*, chief, Productivity Section, Instituto Salvadoreno de Fomento de la Produccion; *Hector Pineda*, general manager, Pineda-Ginjaume; *Galeas Castellanos*, chief purchasing agent, Fabrica de Hilados y Tejidos; and two interpreters, *Isidor Calin* and *Javier Larraz*.

●

Russell Wiggin was promoted February 1 to chief chemist of The American Thread Company, Willimantic, Conn.

Mr Wiggin, a specialist in developing and applying special thread bleaches and finishes, has served on American Thread's research staff for thirty-six years. In his new capacity, he will coordinate over-all activities of the research chemical laboratory. He will also further the training of research and operating personnel in the art of thread finishing.



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ADR ADVERTISING INDEX

Allied Chemical Corp.	
National Aniline Division	
Nitrogen Division	
Solvay Process Company	15
Althouse Chemical Company	
American Cyanamid Co.	
American Dyestuff Reporter	69, 71, 73
American Dyewood Co., Inc.	72
Ansbacher-Siegle Corporation	
Antara Chemicals Div., General Aniline & Film Corp.	
Apex Chemicals Co., Inc	4
Arkansas Company, Inc.	
Arnold, Hoffman & Co., Inc.	9
Atlantic Reqning Co., The	
Atlas Electrical Devices Co.	8
Baker Chemical Co., J. T.	50
Becco Chemical Division	
Food Machinery & Chemical Corp.	
Berkshire Color and Chemical Corp.	16
Birch Brothers, Inc.	
Burkart-Schier Chemical Co.	70
Butterworth & Sons Co., H. W.	
Calgon Company	54
Cambell Company, Inc., John	
Carbic-Hoechst Corp.	
Chemical Products Corp.	56
Chlor-Alkali Division	
Food Machinery and Chemical Corporation	
Ciba Company, Inc.	
Columbia Southern Chemicals	
Crescent Chemical Company, Inc.	
De Paul Chemical Co.	
Dexter Chemical Corp.	Third Cover
Diamond Crystal Salt Co.	
Dow Corning Corp.	
Drew & Co., Inc., E. F.	
Eastern Color & Chemical Co.	
Eastman Chemical Products, Inc.	11
Emery Industries, Inc.	60
Emkay Chemical Co.	
Fablok Mills, Inc.	
Fancourt Co., W. F.	
Farbwerke Hoechst, A. G.	
Feeley Co., E. J.	55
Food Machinery & Chemical Corp.	
Becco Chemical Division	
Chlor-Alkali Division	
Foxboro Co., The	
Frankl Associates, Inc., Ernest L.	
Gaston County Dyeing Machine Co.	
Geigy Dyestuffs	
Division of Geigy Chemical Corporation	
General Aniline & Film Corp.	13
General Dyestuff Company	13
Goodyear Chemical Division	5
Goodrich Chemical Company, B. F.	14
Gross & Company, A.	
Hagan Chemicals & Controls, Inc.	52
Hampshire Chemical Corporation	
Harchem Division, Wallace & Tiernan, Inc.	69
Harshaw Chemical Co., The	
Hart Products Corporation, The	47
Hercules Powder Company	
Heyden Newport Chemical Corporation	
Hilton-Davis Chemical Co., Division	7
Hoechst Chemical Corp.	

KNITTING ARTS EXHIBITION NUMBER

Publication Date April 17, 1961

* Advertising Closing Date March 27, 1961

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Klauder Weldon Giles Mach. Co.	
Knitting Arts Exhibition	67
Kolker Chemical Corp.	
Koppers Company, Inc.	3
Laurel Soap Manufacturing Co., Inc.	
Maher Color & Chemical Company	
Manufacturers Chemical Company, Inc.	
Marbon Chemical Div. of Borg-Warner Corp	
May, Inc., Otto B.	
McCarty Aniline & Extract Co.	71
Metalsmiths Div., Orange Roller Bearing Co., Inc.	
Moretex Chemical Products Inc.	
Morton Salt Co.	17
National Aniline Division Allied Chemical Corp.	
Natonal Starch and Chemical Corporation	
Nitrogen Division, Allied Chemical Corp.	
Nopco Chemcal Company	
Nyanza Color and Chemical Co.	
OPW-Jordan	
Organic Chemical Corporation	
Philadelphia Quartz Co.	69
Photovolt Corp.	71
Procter & Gamble Co.	74
Putnam Chemical Corp.	20
Reading Scientific Company	
Refined Products Company	
Rhodia, Inc.	
Rohm & Haas Co.	
Rona Pearl Corporation	
Royce Chemical Company	Fourth Cover
Rudnick, Representatives, Edward S.	
Rumford Chemical Works	
Sandoz, Inc.	29, 30
Scher Brothers	
Scholler Bros., Inc.	
Seydel-Woolley & Co.	
Shell Chemical Company	12
Solvay Process Division, Allied Chemical Corp.	15
Sou-Tex Chemical Company, Inc.	53
Standard Chemical Company	
Sun Chemical Company	
Tanatex Chemical Corp.	Second Cover
Taylor Instrument Companies	
Tennessee Corporation	
Tex-Chem Co.	
Texize Chemicals, Inc.	
Toshin Kogyo Co., Ltd.	
Turbo Machine Company	
Union Carbide Corp.	18
Verona Dyestuffs	
Virginia Smelting Company	6
Wallace & Tiernan, Inc., Harchem Division	69
Wallerstein Company	59
Warwick Chemical Division	
Watkins Salt Co.	
West Indies Chemical Works, Ltd., The	72
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Wolf & Co., Jacques	10
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